The Welding Engineer

Founded by L. B. Mackenzie, 1916

DECEMBER, 1925 — VOL. 10, No. 12

$3.00 per year in U. S. — 608 S. Dearborn St., Chicago, Ill. — Reg. U. S. Pat. Office — $4.00 per year abroad

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are daily being cut up into marketable sizes with Airco 99.5% Pure Oxygen and Airco-Davis-Bournonville Cutting Torches in hundreds of scrap yards

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IF YOU are a user of Oxweld apparatus, your equipment undoubtedly will be working efficiently, because Oxweld fieldmen inspect it from time to time, make adjustments, and supervise minor repairs.

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St. Louis	Missouri
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REGARDLESS of how well oxy-acetylene apparatus is made or how carefully it is used, repairs, replacements and adjustments will be needed if the equipment is to function efficiently day in and day out. In this your oxwelding apparatus is like your automobile.

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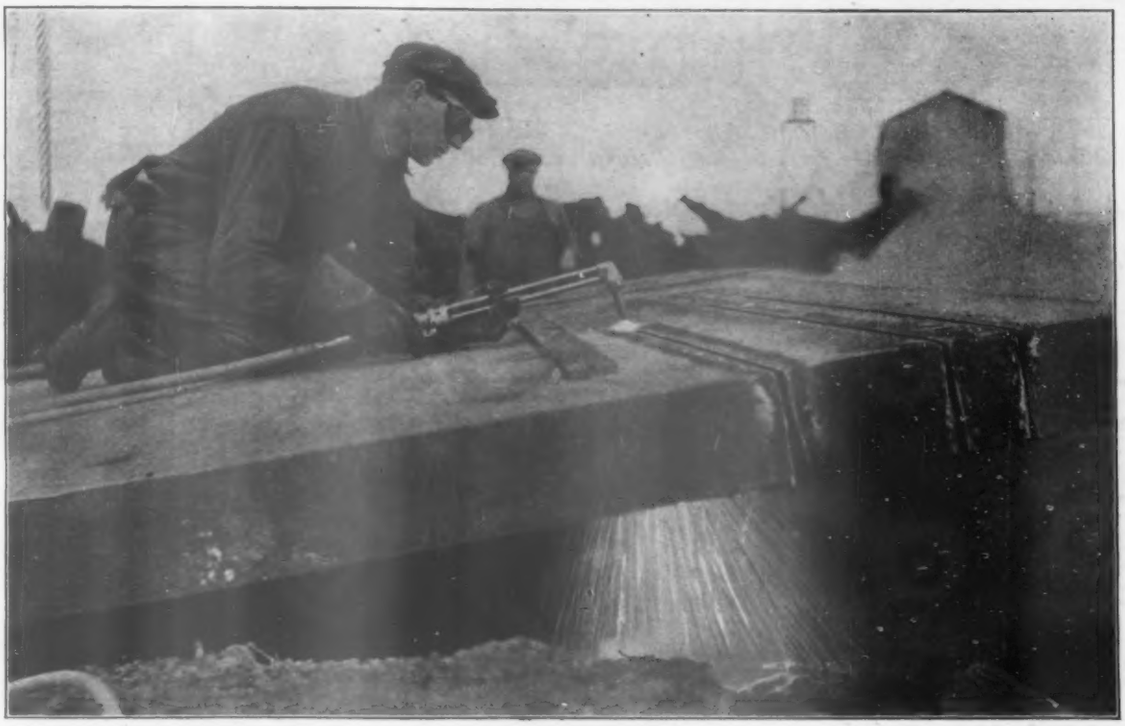

"Like a Sharp Knife, Through a Loaf of Bread"

LIKE a sharp knife through a loaf of bread—that's the way the new Purox Cutting Torches eat their way through heavy metal.

Here's a case in point, shown in the above illustration, where eight-inch armor plate, in a Western shipyard, is being cut into neat, even slices with a Purox Torch at the rate of six feet in eleven minutes.

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Buyers' Index

Readers of The Welding Engineer will find this index to contain the most accurate information obtainable relating to welding apparatus and supplies. The advertising section includes the principal manufacturers of the United States.

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National Carbon Co.
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Wm. Wharton Jr. & Co.

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See "Cutting Electrodes"

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General Electric Co.
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Ideal Face Shield Co.
Lincoln Electric Co.
Morris, Wheeler & Co.
H. E. Steinbock
Strauss & Buegeleisen
Todd Shipyards Corp.
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Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.
Willson Goggles, Inc.

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Central Steel & Wire Co.
Wm. Cramp & Sons
C. H. Hollup Corp.
Morris-Wheeler & Co.
Oxweld Acetylene Co.
Page Steel & Wire Co.
Purox Co.
Reid-Avery Co.
Roebling, John A., Sons Co.
Steel Sales Corp.
Seneca Wire & Mfg. Co.
Stoody Co.
Torchweld Equipment Co.
Wickwire-Spencer

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Griesheim
The Hoxite Co.
Metal & Thermit Corp.
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Griesheim
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Superior Oxy-Acetylene Machine Co.
U. S. Welding Co.

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Willson Goggles, Inc.

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Wodack Electric Tool Corp.

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General Electric Co.
C. H. Hollup Corp.
Ideal Face Shield Co.
Lincoln Electric Co.
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Strauss & Buegeleisen
Westinghouse Elec. & Mfg. Co.
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International Oxygen Co.

HYDROGEN GENERATING PLANTS
International Oxygen Co.

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Modern Engineering Co.
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Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
U. S. Welding Co.

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This Wilson Wire—
It's Always the Same"

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Purox Co.
Superior Oxy-Acetylene Co.
Torchweld Equipment Co.
U. S. Welding Co.

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Griesheim
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Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Mach. Co.
Torchweld Equipment Co.
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Griesheim
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

NITROGEN
Air Reduction Sales Co.
Gas Products Association
Linde Air Products Co.
International Oxygen Co.

OXYGEN
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Gas Products Association
International Oxygen Co.
Linde Air Products Co.
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RAIL JOINT WELDERS
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Wodack Electric Tool Corp.

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Griesheim
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

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Griesheim
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

THERMIT WELDING
Metal & Thermit Corp.

TORCHES (Welding and Cutting)
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Bastian-Blessing Co.
Carbic Mfg. Co.
Griesheim
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
International Oxygen Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

TRUCKS (Cylinder)
Bastian-Blessing Co.
Carbic Mfg. Co.
International Oxygen Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.

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Bastian-Blessing Co.
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The Welding Engineer 608 S. Dearborn St., Chicago

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Wilson....700 S. Goldsboro St.

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Fargo....Fifth St. and Second Ave., N.

OHIO
Akron....97 East South St.
Athens....Corner Factory and Moore Sts.

Canton....618 Mulberry Road, S. E.
Cincinnati....67 Plum St.
Cleveland....1348 Hanna Bldg., Annex
Columbus....330 Dublin Ave.
Dayton....104-114 S. Wayne Ave.
Gallipolis....700 First Ave.
Lima....336 E. High St.
Mansfield....40 W. Third St.
Steubenville....324 N. Seventh St.
Toledo....414 S. Erie St.
Youngstown....Jones and Brittain Sts.
Zanesville....Cor. Main and 2nd Sts.

OKLAHOMA
McAlester....127 East Chickasaw St.
Oklahoma....4 West Park Place
Tulsa....1-11 N. Boulder St.

OREGON
Portland....15th and Hoyt Sts.

PENNSYLVANIA
Allentown....311 Gordon St.
Beaver....244 Buffalo St.
DuBois....Weber Ave. and Franklin St.
Erie....1502 Sassafras St.
Greensburg....Clark and George Sts.
Harrisburg....25 S. Tenth St.
Hazelton....223 East Mine St.
Johnstown....Messenger St. and B. & O. R. R.
Philadelphia..Delaware Ave. and Brown Beach St.
Phillipsburg....P. O. Box 146, North Front St.
Pittsburgh....1202 Chamber of Commerce Bldg.
Pottsville....Railroad and Sanderson St.
Scranton....225 Vine St.
Shamokin....Fifth and Walnut Sts.
Sharon....Budd St. and South Irvine Ave.
Spangler....
Wilkes-Barre....150-156 E. Northampton St.
Williamsport....Canal and Court Sts.

SOUTH CAROLINA
Charleston....3 Liberty St.

SOUTH DAKOTA
Watertown....224 First Ave., N. W.

TENNESSEE
Chattanooga....600 E. 10th St.
Knoxville....426 West Depot Ave.
Memphis....671 S. Main St.
Nashville....102-104-108 Broadway

TEXAS
Amarillo....P. O. Box 697, 101-105 Pierce St.
Beaumont..Santa Fe Bldg., 1118-28 Jackson St.
Dallas....Santa Fe Bldg., 1118-28 Jackson St.
El Paso....1601 Magoffin Ave.
Houston....812 Live Oak St.
San Antonio....115 S. Medina St.
Waco....315 S. Thirteenth St.
Wichita Falls....1507 Lamar St., P. O. Box 1002

UTAH
Salt Lake City....108 W. Second South St.

VIRGINIA
Lynchburg....1324 Commerce St.
Norfolk....120 W. Plume St.
Richmond....1709 East Cary St.

WEST VIRGINIA
Bluefield....195 Roanoke St.
Charleston....Broad St. and K. & M. R. R.
Clarkesburg....608-612 North Third St.
Elkins....Railroad Ave. and First St.
Fairmont....Auburn St. and B. & O. R. R.
Huntington....Seventh Ave. and Elm St.
Morgantown....610 University Ave.
Mount Hope....P. O. Box 416
Mullens....P. O. Box 37
Wheeling....42rd and McCulloch Sts.
Williamson....Ft. of West 2nd St., Box 305

WASHINGTON
Seattle....304 Railroad Ave., S.
Spokane....162 S. Post St.

WISCONSIN
Appleton....909 N. Lawe St.
La Crosse....Front and King Sts.
Madison....513-19 Williamson St.
Marshfield....South Dept. and Maple Sts.
Milwaukee....120-134 Jefferson St.

WYOMING
Casper....222 Industrial Ave.

UNION CARBIDE IS EASILY OBTAINABLE EVERYWHERE

The right foundation for good cutting and welding is pure Acetylene

We supply it in:

Carload lots, truckloads or single cylinders.

Whatever your acetylene gas requirements may be let us quote you. Outline your gas consumption and our prices will be promptly furnished.

Supplied in the following size cylinders:

10x30in. size	- -	125 cu. ft. capacity
12x36in. size	- -	225 cu. ft. capacity
12x44in. size	- -	275 cu. ft. capacity

COMMERCIAL ACETYLENE

Means pure acetylene.

COMMERCIAL SERVICE

Means prompt service.

No matter what your gas requirements are you will be interested in our sales plan.
Ask our nearest office to tell you about it.

Commercial Acetylene Supply Company, Inc.

General Office: 80 Broadway, New York City

Branches:

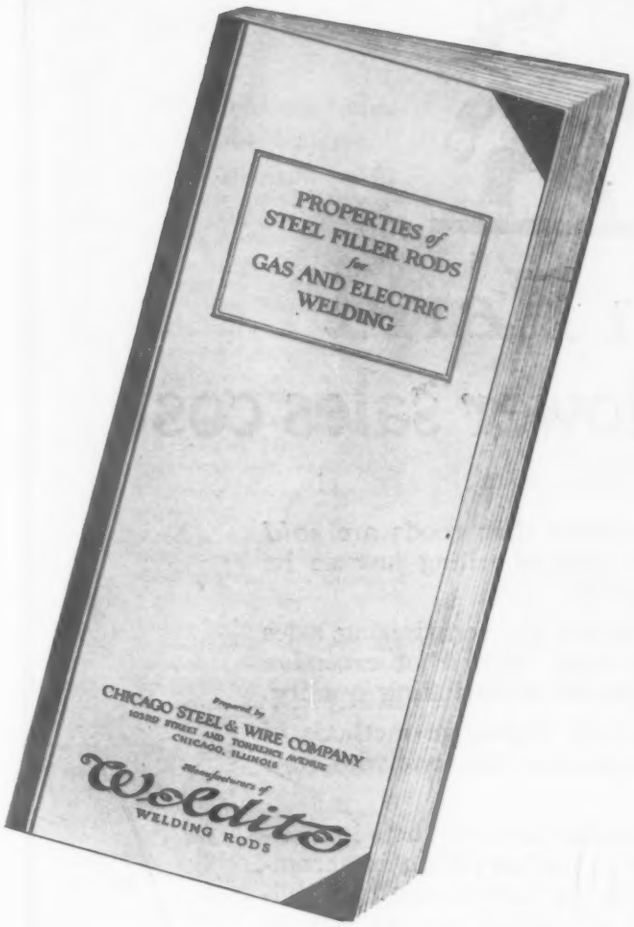
80 E. Jackson Blvd.
Chicago, Ill.

421 Trust Co. of Georgia Bldg.
Atlanta, Ga.

683 Atlantic Ave.
Boston, Mass.

550 Monadnock Bldg.
San Francisco, Calif.

New Welding Rod Facts



Every user has at sometime had Filler Rod trouble which he did not understand. The answer is in this booklet.

Free for the asking

This Booklet

Tells for the first time the scientific facts concerning Welding Rod. It answers in plain language literally hundreds of questions for the welder.

Do you know---

Why sulphur segregated to the center of a rod does no harm but if distributed throughout the rod causes poor welds?

That water under some conditions will ruin a welding rod?

Where gas gets into a welding rod and what its presence means to the welder?

How carbon and manganese affect an electrode?

What the real difference is between gas and electric rod?

Why some welding rod is no better than fence wire and some fence wire makes good welding rod?

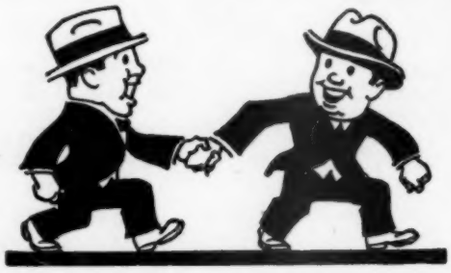
In addition to the text there is a Catalog Section

This describes the WELDITE Line of Iron or Steel Filler Rods. It includes five different grades of steel rod for gas welding and five for electric welding. These range from practically pure iron to the very highest carbon. It also includes a wonderful nickel steel and a special Chrome-Vanadium Rod for track work.

Ask to have your name on the list to receive all the bulletins published by the Research Department of the

Chicago Steel & Wire Co.

103rd Street & Torrence Avenue :: Chicago, Ill.



Hand in Hand advertising and lower sales cost

It is to the buyer's interest to know that goods are *sold economically* for he pays the cost of selling just as he pays for the cost of manufacturing.

That's why more and more buyers are scrutinizing sales methods of manufacturers, for they know that excessive sales costs mean either higher prices or shrinking quality.

The seller who clings to antiquated, expensive methods of selling is no more entitled to patronage than one who runs an out-of-date factory.

Machinery has cut costs and standardized products in manufacturing and the *machinery of advertising* is accomplishing similar benefits in selling, for advertising in publications such as this one, is not an added expense, but an improved means of communication that takes the place of slower and more costly methods.

These are demonstrated facts and thinking buyers are recognizing the advantage to them of encouraging progressive, economical *sales* methods, such as have been adopted by the companies represented in the advertising pages of this journal.

The advertising these companies are doing not only cuts the cost of selling, but it increases production volume, standardizes quality, and is a guarantee of good faith.

Write us about anything you desire to know about business papers or the fields they cover.

The
ASSOCIATED BUSINESS PAPERS, INC.
Headquarters, 220 West 42nd Street, New York City
Over 120 Publications Reaching 54 Different Fields of Trade and Industry

A.B.P.

"Member of The Associated Business Papers, Inc." means proven circulations PLUS the highest standards in all other departments.

This publication is a member of the A..B. P.

Adv. No. 2111-I

The Welder's Guide
In Using Norweld

Keep the white cone over the puddle, and keep the ends of the filler rod melting in the puddle, not dropping metal into it.

Let the puddle work along into new metal, not flowing over on top of white hot or cooler steel.

Heat the steel as little as possible—just enough to get complete fusion.

Be sure you have a neutral flame of the right size for the thickness of the metal you are welding.

Get a full sized puddle formed before trying to carry the weld along.

Keep the white cone from licking the filler rod.

If the rod seems to feel sticky the puddle is probably too small. It should slide easily and be worked fairly close to the line of the weld.

Too much white hot metal in front of the puddle will reduce the chilling effect of the parent metal and the resulting weld metal will be coarser in structure than it should be.

When welding is interrupted, remove flame from puddle slowly. When it is resumed make puddle include back edge of last ripple.

Use a Norweld Rod of correct size.

A New Welding Achievement
Made with Norweld

THE Pile Driving Ram Head shown above was made by forming and welding boiler plate. This and other similar heads have successfully withstood hammer blows which ordinarily cause cast ram heads to break. This new achievement in welding required the combination of highly developed welding skill and a faultless rod. The welding was done by Austin Welding Works, of Chicago, and the rod used was Norweld.

Norweld is a copper coated, low carbon soft wire for acetylene welding; uniform in quality; recommended for welding of wrought iron, steel, tanks, boiler plate, sheets, angles, flues, etc., where higher tensile strength is required.

A Practical Book on Welding Describing our complete line of Rods.

Copies Mailed Free on Request.

A Welding Rod for Every Job
In Acetylene and Electric Welding

Large stocks of welding rods—a rod for every job in both acetylene and electric welding—are carried in our Chicago Warehouse for immediate shipment. A few important kinds are listed below.

Norweld Special	A*	Elecweld	E
Norweld	A	Steelweld	E
Castweld	A	Wilson Color-tipt Metals	E
Bronzeweld	A	Vanadweld	A&E
Nickleweld	A&E	Hicarweld	A&E
Elecweld Special	E†	High Manganese	A&E

*Acetylene—†Electric

STEEL SALES
CORPORATION

129 South Jefferson Street
CHICAGO, ILL.

J. A. Roesch, Jr., *President* F. W. Walters, *Vice President*
D. R. Hoffman, *Secretary and Treasurer*

Steel, Monel Metal, Nickel, Brass, Copper, Copperweld, Nickel Silver, Phosphor Bronze, Wire Rope.

MAIL THE COUPON FOR SAMPLES

STEEL SALES CORP., 129 S. Jefferson St., Chicago We-D

Gentlemen: Please send us samples of the following rods:—

.....

I do— ☐ Elec. ☐ A. C. ☐ D. C. ☐ Acetylene Welding.

Firm .....

Street .....

City ..... State .....

"NATWELD"

Duo-Fold Safety Oxygen Gauge

Patented

Mechanically Perfect

Safety Accuracy Durability

UNCONDITIONALLY WARRANTED

And What's More—The Price Is Right!

NATIONAL GAUGE & EQUIPMENT COMPANY

WORLD'S LARGEST MANUFACTURERS OF BOURDON SPRING GAUGES

MAIN OFFICE AND FACTORIES—LA CROSSE, WISCONSIN

CHICAGO DISTRICT
JOSEPH HALLA
140 S. Dearborn Street

DETROIT DISTRICT
P. E. STROUP
1208 Kresge Bldg.

NEW YORK DISTRICT
H. T. OWENS
51 East 42nd Street

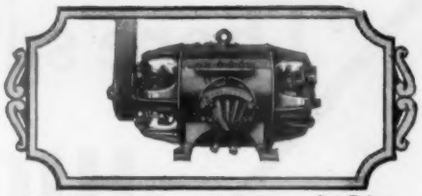
Let This Todd Welder Save You $7,000

WHICH will you have for welding purposes—seven machines to suit seven different needed welding requirements—or the Todd Welder that will meet all needs?

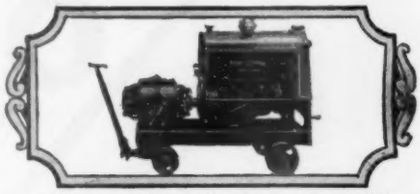
For example, a machine each for the following requirements of 110 volts D.C.; 220 volts D.C.; 550 volts D.C.; 220 volts, 60 Cycle, 2 Phase A.C.; 220 volts, 60 Cycle, 3 Phase A.C.; 440 volts, 60 Cycle, 2 Phase A.C.; 440 volts, 60 Cycle, 3 Phase A.C. would mean an expenditure approximating $7,000. Yet one Todd Twin Pole Arc Welder, gasoline driven, will meet all welding requirements at one initial outlay.

This Todd Welder can be driven from the power take-off of a Fordson engine or any other suitable gas engine or can be belt driven. Power is also supplied for operating electric drills, grinders, chippers, lights and other purposes without interfering with the welding circuit. These Todd Welders are furnished in two types for field work, ER and ER2—and are recommended for use as part of a Fordson. Write us for complete information.

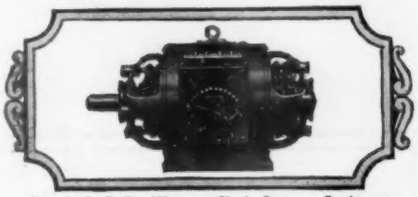
TODD TWIN POLE ARC WELDERS
25 Broadway, New York City



ER—1200 r.p.m.—200 amp.—Single Operator Belt Driven
Length, 33 5-8 inches Diameter, 16 1-8 inches
Net weight, 611 pounds Shipping weight, 680 pounds

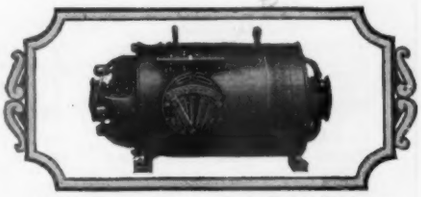


ER—1200 r.p.m.—150 amp.—Single Operator Gasoline Drive
Length, 74 inches Width, 39 inches Height, 60 inches
Net weight, 2475 pounds Shipping weight, 2775 pounds

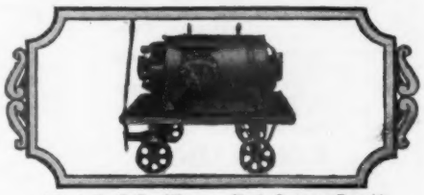


DR—D.C. D.C.—150 amp.—Single Operator Stationary
Length, 33 5-8 inches Diameter, 16 1-8 inches
Net weight, 611 pounds Shipping weight, 680 pounds

DR2—D.C. D.C.—200 amp.—Single Operator Stationary
Length, 35 1-8 inches Diameter, 16 7-8 inches
Net weight, 650 pounds Shipping weight, 710 pounds



AR—A.C. D.C.—200 amp.—Single Operator Stationary
Length, 38 inches Diameter, 17 1-8 inches
Net weight, 765 pounds Shipping weight, 840 pounds



AR—A.C. D.C.—200 amp.—Single Operator Portable
Length, 36 inches Width, 24 inches Height, 12 inches
Net weight, 880 pounds Shipping weight, 955 pounds

TODD
NEW YORK, U.S.A.

"There's No Place Like Home"

TO BUY

HIGH PURITY OXYGEN

Made in Plants Owned and Operated by Your Fellow Citizens. There Is a Personal Touch to the Service Given.

GAS PRODUCTS ASSOCIATION

FIRST TO ADVOCATE HIGH PURITY OXYGEN

ALABAMA
*Birmingham—Burdett Oxygen Co.
Birmingham—Standard Gas Products Co. of Alabama.
*Mobile—Louisiana Oxygen Co.

CALIFORNIA
*Fresno—California Compressed Gas Co.
Los Angeles—California Compressed Gas Co.
Oakland—California Compressed Gas Co.
*Redding—California Compressed Gas Co.
*Sacramento—California Compressed Gas Co.
*San Francisco—California Compressed Gas Co.
*San Jose—California Compressed Gas Co.
*Stockton—California Compressed Gas Co.

COLORADO
Denver—Colorado Compressed Gas Co.

ILLINOIS
Chicago—Acme Oxygen Co.
Burdett Oxygen & Hydrogen Co.
Swift and Company.
Peoria—Electrox Co.

INDIANA
*Evansville—Kentucky Oxygen-Hydrogen Co.
Indianapolis—Indiana Oxygen Co.
Logansport—Logansport Oxygen Co.
*South Bend—Burdett Oxygen-Hydrogen Co.

IOWA
Bettendorf—Bettendorf Oxygen-Hydrogen Co.

KENTUCKY
Louisville—Kentucky Oxygen-Hydrogen Co.

LOUISIANA
New Orleans—Louisiana Oxygen Co.
Shreveport—The Bain-Beaird Co.

MARYLAND
*Baltimore—Southern Oxygen Co.

MASSACHUSETTS
Everett—New England Compressed Gas Co.

MICHIGAN
Detroit—Burdett Oxygen Co. of Detroit.
Wall Bros. Co.
*Grand Rapids—Grand Rapids Welding & Supply Co.
Muskegon—Michigan Oxy-Hydric Co.

MINNESOTA
Minneapolis—Commercial Gas Co.

MISSOURI
Kansas City—Kansas City Oxygen Gas Co.
Ox-Hydrogen Mfg. Co.
Springfield—Tulsa Oxygen Co.

MONTANA
Butte—Mountaineers Welders' Supply Co.

NEBRASKA
Omaha—The Balbach Co.

NEVADA
*Reno—California Compressed Gas Co.

NEW JERSEY
Newark—International Oxygen Co.
*New Brunswick—International Oxygen Co.
*Paterson—International Oxygen Co.
*Plainfield—International Oxygen Co.
*Trenton—Paschall Oxygen Company.
*Trenton — International Oxygen Co.

NEW YORK
*Brooklyn—International Oxygen Co.
*Long Island — International Oxygen Co.
New York—American Oxygen Service Co.
*New York—International Oxygen Co.

NORTH CAROLINA
Charlotte—Carolina Standard Gas Products Co.

OHIO
Canton—Buckeye Oxygen Co.
Cincinnati—Ohio Electrolytic Oxygen Co.
Cleveland — Burdett Oxygen Co. of Cleveland.
*Cleveland — Clarke Chemical Co.
Columbus—Gas Products Co.
Dayton—Dayton Oxygen & Hydrogen Products Co.
Niles—Ohio Oxygen Co.
Toledo—International Oxygen Co.
Wickliffe — Clarke Chemical Co.

OKLAHOMA
Oklahoma City—Burdett Oxygen Co. of Oklahoma City.

OREGON
Portland—Portland Oxygen & Hydrogen Co.

PENNSYLVANIA
*Allentown — Paschall Oxygen Company.
*Lancaster — Paschall Oxygen Co.
Norristown — Burdett Oxygen Co.
*Philadelphia—Burdett Oxygen Co.
Philadelphia—Paschall Oxygen Co.
Pittsburgh—Burdett Oxygen & Hydrogen Co.
Verona—International Oxygen Co.
*York—Paschall Oxygen Company.

RHODE ISLAND
*Providence — New England Compressed Gas Co.

TENNESSEE
Chattanooga—Burdett Oxygen Co.
*Johnson City—Kentucky Oxygen-Hydrogen Co.
*Knoxville — Burdett Oxygen Co.
*Knoxville—Kentucky Oxygen-Hydrogen Co.
Memphis — Memphis Oxygen Co.
*Nashville—Burdett Oxygen Co.
*Nashville—Kentucky Oxygen-Hydrogen Co.

TEXAS
Beaumont—Magnolia Gas Products Co.
*Dallas—Burdett Oxygen Co. of Texas.
Ft. Worth — Burdett Oxygen Co. of Texas.
*Galveston—Gregory Auto Supply Co.
Houston — Magnolia Gas Products Co.
*Ranger—Burdett Oxygen Co. of Texas.
*Waco—Burdett Oxygen Co. of Texas.
*Wichita Falls — Burdett Oxygen Co. of Texas.

UTAH
Salt Lake City—Utah Compressed Gas Co.
*Ogden—Utah Compressed Gas Co.

VIRGINIA
*Norfolk—Portsmouth Oxygen Corporation.
Portsmouth—Portsmouth Oxygen Corporation.
South Washington — Southern Oxygen Co.

WASHINGTON
*Bellingham — Washington Compressed Gas Co.
*Everett — Washington Compressed Gas Co.
Seattle—Washington Compressed Gas Co.
*Tacoma—Washington Compressed Gas Co.

WISCONSIN
*Appleton — Universal Oxygen Co.
*Fond du Lac—Universal Oxygen Co.
*Green Bay—Universal Oxygen Co.
Kenosha — Wisconsin Oxygen & Hydrogen Co.
*Madison — Universal Oxygen Co.
*Manitowoc—Universal Oxygen Co.
Milwaukee—Universal Oxygen Co.
Sheboygan—Universal Oxygen Co.

*Signifies Warehouses

Reliability!

Economy!

Thermit Welding, for more than twenty years, has been steadily consolidating its position in the welding field, and is now recognized wherever welds are to be made, as a method admirably adapted for use on both medium and large sections, and equally economical in both.

Thermit is prepared from only the purest materials, compounded under the supervision of a trained technical staff. Uniformity of composition is assured, and the steel produced has such high tensile strength, ductility and resistance to fatigue that it will withstand with ease the stresses and strains to which the weld is subjected.

No need to try to guess how much the member will contract on cooling! This has been accurately determined for any gap and section, and can be allowed for.

The low cost of Thermit Welding is definite, and can be counted on. We shall be glad to demonstrate this to you, and you can prove it yourself.

Send for Pamphlet No. 1879

THERMIT

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY . NEW YORK ,. N.Y.

Pittsburgh Chicago Boston S. San Francisco Toronto

Lift yourself by your boot straps

THROUGHOUT the past year these advertisements have told you about Linde Process Service for Linde users. They have shown how it can help you, whether you have only a comparatively simple job, or whether you want to make the oxy-acetylene process part of your production work with all the managerial and engineering problems that this involves.

Linde Process Service goes even further. Under the title of Procedure Control, instructions are being assembled for every application of the oxy-acetylene process. So, when you ask for help, we shall be able to send you a set of instructions for your particular job. They will tell you how to select your materials, how to instruct your welders, how to set up and carry out the work, and how to test the finished job.

So you can, in reality, lift yourself by your boot straps. Linde Service men will always be available when needed, but, with the aid of Procedure Control alone, you will be able to apply the oxy-acetylene process to your manufacturing problems.

Next year our advertising will describe some of the outstanding achievements of the oxy-acetylene process in industry—achievements made possible by the use of Linde Process Service.

Check the books you want, tear out this list and mail it to the nearest District Office

- ☐ Cast Iron Welding by the Oxy-Acetylene Process
- ☐ The Dependability of Cast Iron Welding
- ☐ Gas Welded Pipe Joints
- ☐ How Welded Joints Solved Pipe Line Troubles
- ☐ Step by Step in Oxwelding a Pipe Joint
- ☐ Welding Small Tanks by the Oxy-Acetylene Process
- ☐ The Oxygen Lance
- ☐ Welding and Cutting for the Manufacture and Maintenance of Chemical Equipment
- ☐ Step by Step in Gas Welding a Cylinder Block
- ☐ Severing Metals by Oxidation
- ☐ The Handling, Storage and Return of Cylinders for Compressed Gases
- ☐ The Importance of Managerial Understanding of Welding

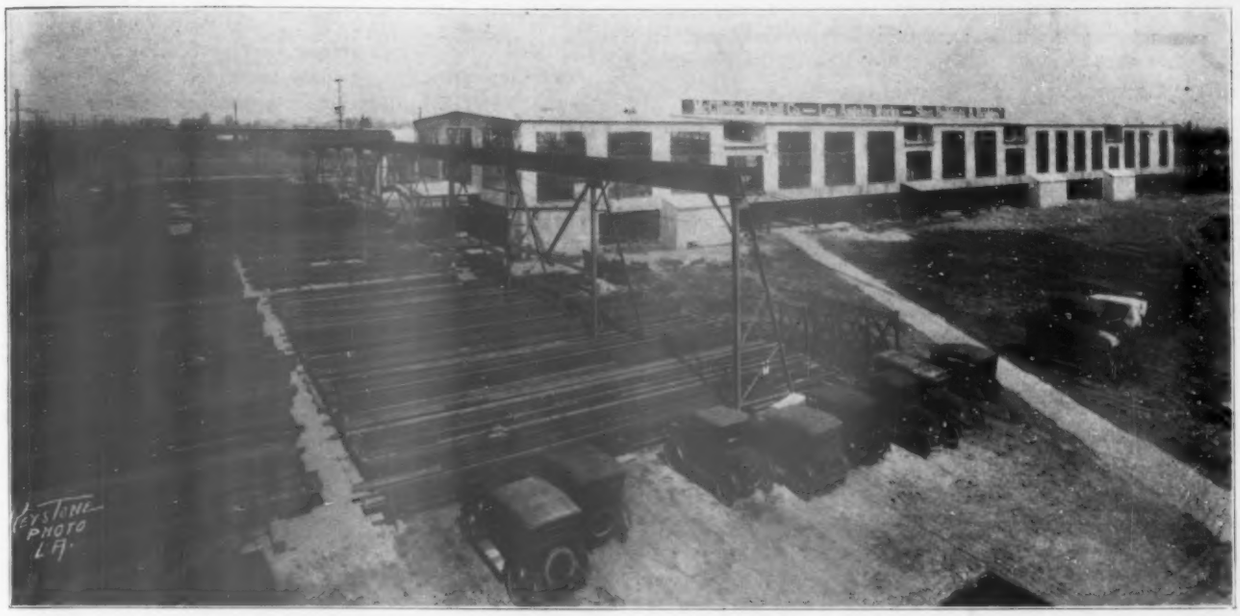
THE LINDE AIR PRODUCTS CO.

General Offices:
Carbide and Carbon Building, 30 E. 42d Street
New York, N.Y.

37 Plants *22 District Sales Offices* *91 Warehouses*

LINDE OXYGEN

YOU CAN DEPEND ON THE LINDE COMPANY



The $1,000,000 Los Angeles Plant of the McClintic-Marshall Company of California

Customer Demands Welded Product

Insists That Steel Hoppers Be Welded as Specified in Order — Manufacturer Pleased With Results

THE largest structural steel fabricating plant in Southern California, with a monthly capacity of 1700 tons, has adopted electric welding as a means of fastening structural pieces together wherever it is practicable and permissible by engineers. The plant is owned and operated by the McClintic-Marshall Company of California, a subsidiary of the national concern, which maintains nine other plants in various sections of the country, and is located at 110th street and South Central avenue in Los Angeles.

The adoption of welding in the fabrication process will eliminate in large measure the use of rivets and will undoubtedly result in a reduction in operating costs at the plant, according to F. C. Todd, Jr., works manager, who was formerly connected with the McClintic-Marshall Company in the east.

"Welding in the past has been looked upon more as an emergency measure for repair work and not as a construction feature of new work," Mr. Todd said. "My experience in the east has been that very seldom we used welding for new work, but in the case of a break down, we welded the material and this same procedure has been carried out in most of the other industries throughout the eastern territory. Our Los Angeles plant was opened for production in the latter part of July of this year and since that time quite a few of the jobs which we fabricated called for a portion of the work to be welded. However, I did not think much of the idea as I still had a notion that welding could best serve its purpose when used to remedy defects as we had done in the east. If a hole had been punched wrong, we were in the habit of welding it and that was the extent of our welding operations.

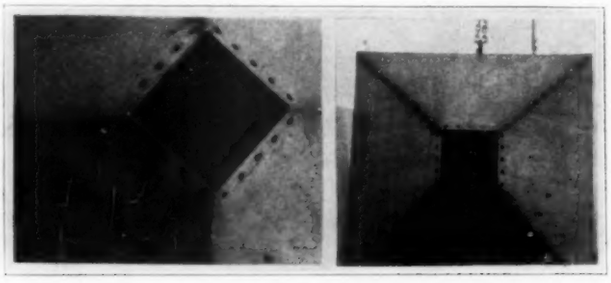
"Our opinions of the uses that welding could be put to were changed only recently and solely because of a contract which we received from the Phelps-Dodge Corporation of Douglas, Arizona, requiring the fabrication of twenty-four hoppers, the seams of which were to be welded and not riveted as has been the customary practice. We endeavored to have the specifications changed in order to eliminate the welding, but the Phelps-Dodge Corporation was insistent as they desired a dust-proof hopper which is more easily obtained with welding than with riveting.

"As we had no other choice, we purchased the necessary welding equipment, of the generator type made by the General Electric Company, and welded the twenty-four hoppers required, using a low carbon electrode, of the Roebling make, sizes ⅛" and 5/32". We used D.C. current, 75 volts, while the drive motor was 440 volts, A.C."

According to Mr. Todd, the hoppers were fabricated from pieces of structural steel, ¼" in thickness, just as the material came off the shears, without any preparation whatsoever for welding. As the sections welded were at approximately 90 degrees, there was no beveling necessary. The straight sheared edges allowed sufficient opening for the welding, which was done by beading, making continuous seams. All work was done in an inverted position; that is, the welding was done on a slope of 45 degrees.

We tested the work by mauling the portions welded with results that practically astounded us,"

Mr. Todd declared. "We were unable to fracture the weld in any way although portions of the plate within two inches of the weld were pretty badly dented without any apparent denting or fracture along the weld. After completing this job, in which the tightness of the weld was the most important consideration as the hoppers were to be dust-proof, I am fully convinced that on work of this character, welding is not only considerably cheaper but is far better than riveting. The strength of the weld obtained at the sections of the material joined together and the finished appearance of the material were far superior to that which would have been obtained had a riveted job been called for.



Left—Close-Up of Weld. Right—A Welded Hopper

"Using the welding method, we saved approximately fifty percent of the labor costs of riveting, and, in addition, secured a much better job in all ways. This particular contract has convinced us that there are great possibilities for electric welding in the steel fabricating industry and it is our intention to use this method whenever it is possible and practicable."

The McClintic-Marshall Company plant in Los Angeles is an exact duplicate of the Carnegie, Pa., plant of the national concern, and is one of the finest equipped steel fabricating plants in the entire western territory, C. D. Marshall, of Pittsburgh, is president; H. H. McClintic, also of Pittsburgh, is secretary; and W. B. Kyle, of Los Angeles, is resident vice president and general manager. The plant occupies a ten-acre tract and employs approximately 200 men.

CLEVELAND SECTION EXPLAINS WELDING TO OTHER ENGINEERING BODIES

The November meeting of the Cleveland section of the A. W. S. was a most enjoyable affair. It was a joint meeting with the A. S. S. E., A. S. M. E., and the C. E. S., the A. W. S.acting as host.

The members of the four societies met in the Cleveland engineering room of the Hotel Winton and went to the plant of the Lincoln Electric Company where all had an opportunity of seeing arc welding done on a large scale, as the Lincoln plant manufactures practically all of their motor parts for assembly, using either the carbon or metallic arc process. The value of assembling steel parts into form and eliminating castings quite impressed all present. Immediately following this inspection trip the party motored to the Cleveland school of Technology where they were given an opportunity of seeing steel pipe beveled with the oxy-acetylene cutting torch and welded by the oxy-acetylene process. A standard six-inch sand cast iron pipe was also "bronze welded" for the benefit of those present. Mr. H. E. Winkleman of the Purox Co. made the demonstration, even showing the ease with which an overhead weld could be made. The party then went to the Hotel Winton where the six o'clock table d'hote dinner was enjoyed in the main dining-room, one large table having been set up for the purpose.

The evening's meeting which was held in the ballroom of the Winton was a most interesting one. Mr. A. F. Davis of the Lincoln Electric Co. presented a film showing the new building recently erected in Canton, Ohio, entirely by electric welding. The film brought forth quite a little discussion from the engineers present which showed that most of them were skeptical as to ultimate strength of the structure.

Following Mr. Davis' talk Mr. A. G. Bissell of the Westinghouse Electric & Manufacturing Co., Pittsburgh, presented a paper on the welding of fabricated steel. Mr. Bissell's paper was accompanied by a series of slides and showed ordinary structural steel welded together under ordinary conditions and then subjected to vibration tests and crushing loads. The unusual and severe tests that his slides depicted apparently put an end to further discussion of the merits of electric welding at least, as the evidence of the strength of welded steel presented was so clear that no one had anything to say. Many members of the visiting engineering societies, however, were very free in expressing their surprise at the results shown and from expressions heard, Mr. Bissell's paper has done in Cleveland at least a great deal to satisfy architects and engineers that welding is a safe process to use.

Mr. H. E. Wetzel of the Cleveland firm, Smith & Oby, heating and plumbing contractors, next gave a talk on industrial pipe welding and brought out many interesting points both as to actual cost saving in installing, elimination of expensive fittings, and one very important statement was that the heat loss on the average heavy screwed flange was equivalent to 30 to 40 feet of actual pipe exposed. Another point Mr. Wetzel stressed was the ease and economy of making up special headers requiring drips, different waste outlets, and uptakes. Mr. Wetzel also briefly outlined some of the work that will be done on one of Cleveland's newest buildings.

The idea of joint meetings is a new one this year and from the attendance and interest displayed it seems that this method should prove worthy of adaptation in other localities having local sections of the various technical societies.

MASTER WELDERS ORGANIZE

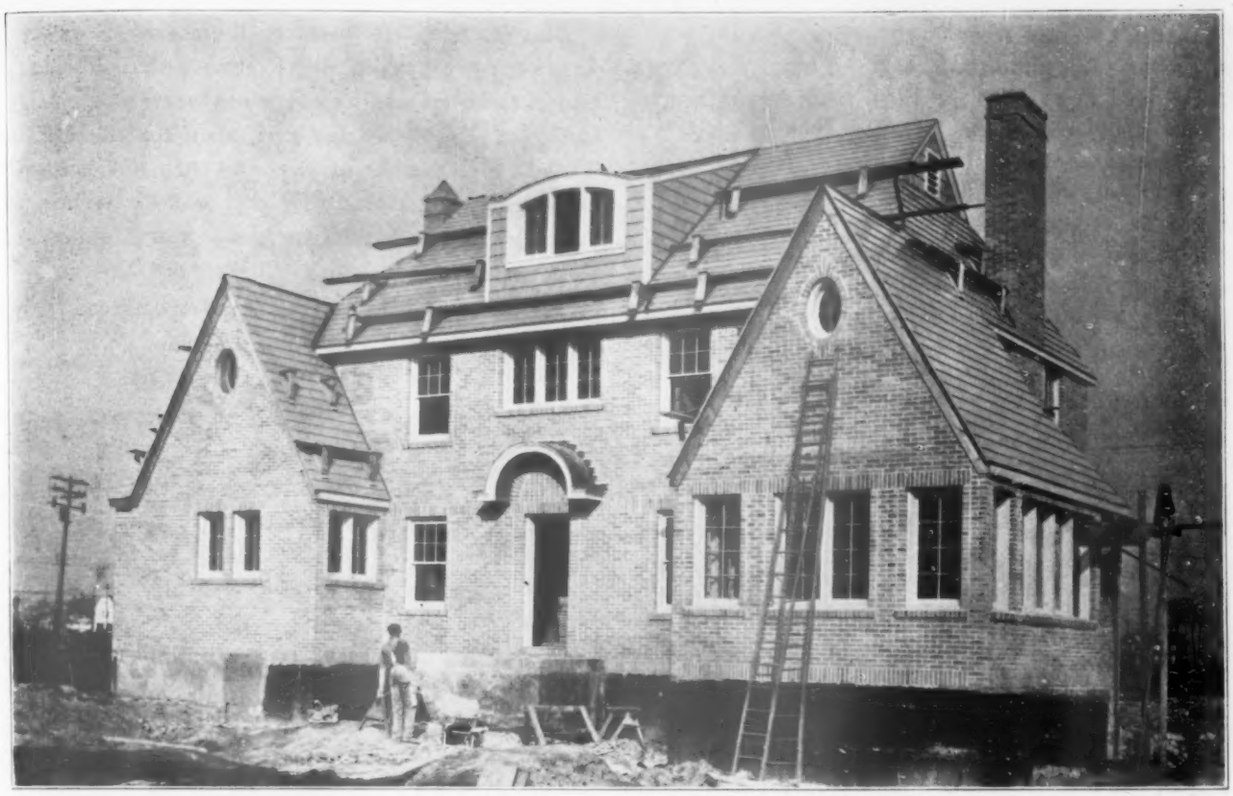
Welding on the Pacific Coast was thought to be receiving a black eye due to the fact that jobs were taken to inexperienced welders and were frequently badly bungled. In order to counteract this situation, the first chapter of the Master Welders Association was formed in Oakland, California, by Mr. R. O. Waldman, representative of the Chicago Steel and Wire Company.

The object of the association is to advertise to the general public what master welders are able to accomplish in the line of general repair work. A general advertising campaign is under way and all of the modern methods of spreading the propaganda will be used including radio broadcasting.

Each member of the association pays monthly dues of $10.00 and the association in Oakland started with twelve answering the roll call. Only the proprietors of competent welding shops are eligible for membership and everybody else is excluded.

The results obtained by the chapter in Oakland were so successful that another chapter was almost immediately formed in San Francisco with an initial membership of fourteen.

Further information as to just how these chapters were formed can be obtained by application to Mr. R. O. Waldman, care Chicago Steel and Wire Company, 200 Davis Street, San Francisco, California.



$50,000 Residence on which Glass Coated Shingles Were Used

Cutting Glass Shingles With the Torch

The Oxy-Acetylene Process Makes It Possible to Keep Down the Price of a Desirable Building Material

SOUNDS quite a bit like the story of "Broken Legs Welded" which was told some years ago, doesn't it? That one, you will remember was about a fellow who was working on top of a pile of heavy scrap iron. He fell and a shaft hit him across the leg, breaking it at the knee. The old reliable oxy-acetylene welding torch was put on the job and within ten minutes he was back on top of the scrap pile and on the job. In this case, though, it was, you will remember, the steel joint in his artificial leg which was welded.

A story submitted by C. E. Phillips of the Purox Company, Detroit, is something the headline of this article does not entirely belie. As we all know it seems that heretofore only tools having a diamond cutting edge have been suitable for any glass-cutting operations—this, despite the experience of various cutting edge people and the work of other interested scientific individuals.

The solution of the problem of cutting the Vitrified Metallic Roofing Tile is therefore interesting.

One of the photographs shows the construction of this Tile which is the result of over five years experimental work by Will Burgett—one of the oldest roofing men in Detroit. It is made of 22-gauge metal in various sizes. A glass-porcelain composition is baked on at 1600 degrees Fahrenheit. This covering is furnished in any color and also a combination of colors, such as marble effect etc. and The Vitrified Metallic Roofing Co., of Detroit claim:

Saves construction expense incurred when tile or slate is used.

Each tile weighs 1 lb. which means but 225 lbs. to the "square."

One-sixth the weight of tile, one-third the weight of slate and one-half the weight of wood shingles (when wet).

Saves insurance as it is absolutely fire-proof.

Solves the re-roofing problem as it is easily applied on the regular roof construction.

Unlimited "life"—"The Vitrifying process fixes that."

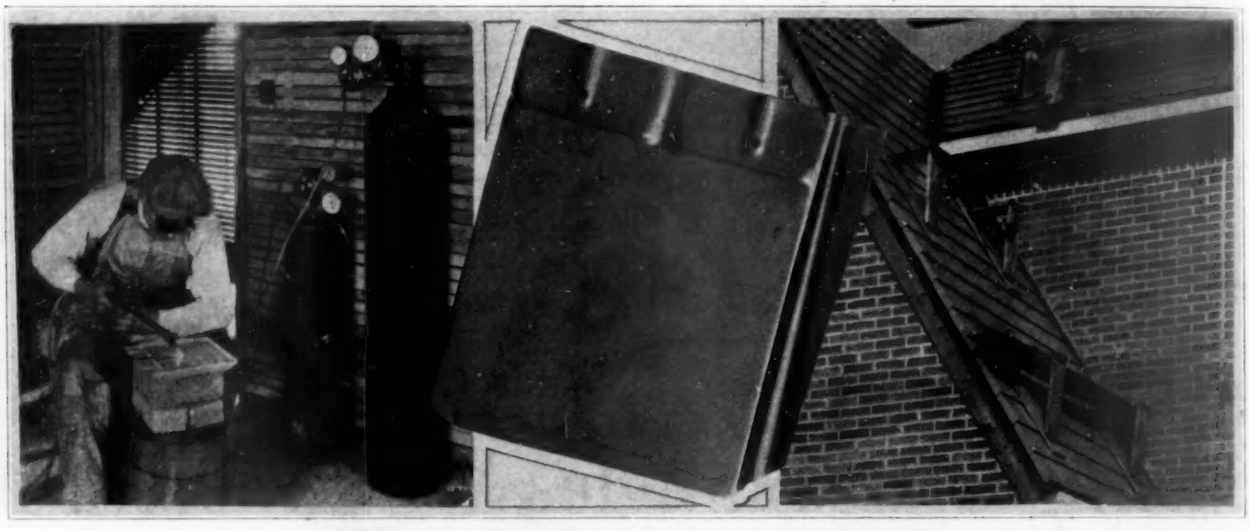
In fact, the producers admit the only objection that can be raised in the mind of architect, building contractor or owner, is gettinng the proper "fit" around corners, chimneys, ventilators, etc. It is obvious that the expense of supplying these shingles to fit every roof construction would involve an enormous investment in dies for stamping, and consequently increase the cost of the tile (cost is now less than ordinary tile or slate).

And, as usual, when there is a problem dealing

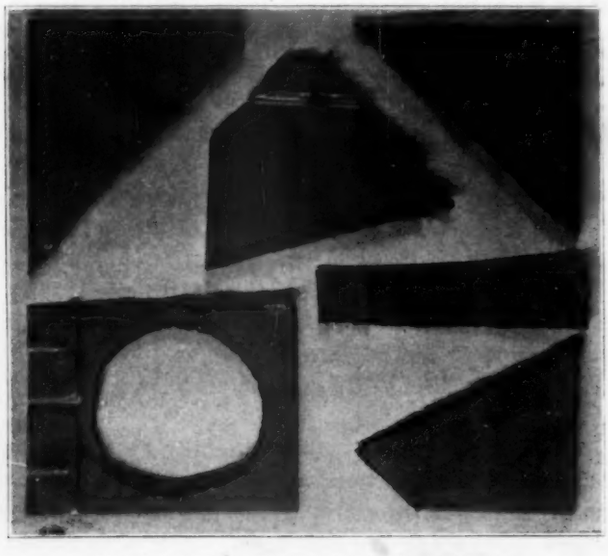
with metal, the oxy-acetylene torch solved the problem. A second photograph shows how the Purox torch is used in cutting the tiles in the many shapes and sizes required for the job. Another shows a few of the sizes and shapes in which cut. Another illustrates the problem encountered in applying the tile. The picture at the head of the story shows the completed roof of a $50,000.00 residence in the exclusive Grosse Point district in Detroit.

The raggedness of the cuts are really exaggerated by the photo showing several cuts, alhough this may be attributed also to the fact that these cuts were made by a man who had never had a torch in his hand before. One big feature of the tile is that it is absolutely-rust-proof, and it is of interest to everybody to know that thorough tests have proven that the complete coating of the cut edge, by the fused-glass-composition, serves to eliminate the corrosion of the cut edge—just as the regular coating serves this purpose.

This article, we believe, illustrates a point we have tried to make many times—that business is bound to be created by every oxy-acetylene apparatus salesman who keeps his eyes open for the OPPORTUNITY to use the process and then tells others. It also clearly illustrates that the field for welding and cutting with the building trades is not confined solely to structural steel work. Lets "tell the story" to architects and everybody concerned with the building trades. It is a new field—but a big one.



Left—Cutting a Shingle. Center—Close-Up of Cut. Right—The Job

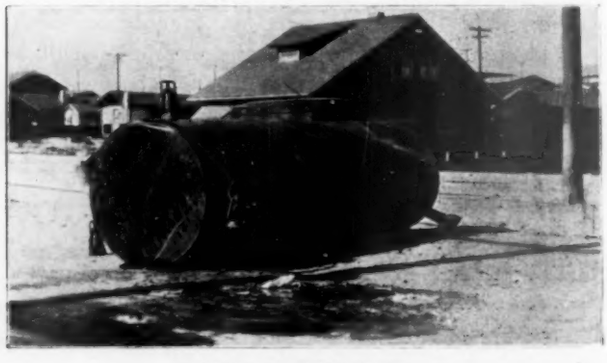


Showing Various Torch Cuts on Glass Shingles

A WELDED TANK WHICH STOOD A HARD BUMP

By R. Shuhart

A short time ago a fast travelling street car train in a town on my route bumped into a 1400 gallon tank containing hot road oil and spilled the oil over the car and the street with slight injury to the motorman and conductor. I had heard of the accident and took occasion to drive by there and noticed that the tank was of welded construction. Therefore, I turned back to examine it for breaks. I was not surprised to find that there were no broken welds, but the photograph shows that a riveted tank would not have stood the same kind of an accident without rupturing some of the seams. The tank was on a trailer towed by a truck and was struck by a two car train when crossing the tracks. The tank was knocked completely off the body and the trailer was torn from the truck and carried half a block by the train. Note that the welded pipe connection was bent but not broken off.



No Broken Welds Here

Arc Welding Structural Steel*

Value of Welding, Compared to Riveting, Is Shown in Descriptions of Welded Buildings and Crane Runways

By R. A. Storm†

IT will be necessary to take you back to some experiments made to enable us to increase the efficiency of our riveted connection in fabricating Electric Overhead Traveling Crane Girders.

The Morgan Engineering Company were the the first ones to build cranes for handling hot metal in a steel mill. Were it not for such inventions as those of Mr. Thos. R. Morgan, Sr., the founder of our organization, it would be impossible to roll the plates and shapes necessary to fabricate a steel structure. There are no riveted connections, to my knowledge, where the rivets are subjected to more severe treatment than are the rivets in the girders of our open hearth charging machine cranes and our soaking pit charging cranes.

In order to make this paper more clear several illustrations have been prepared to show different uses of welding in this field.

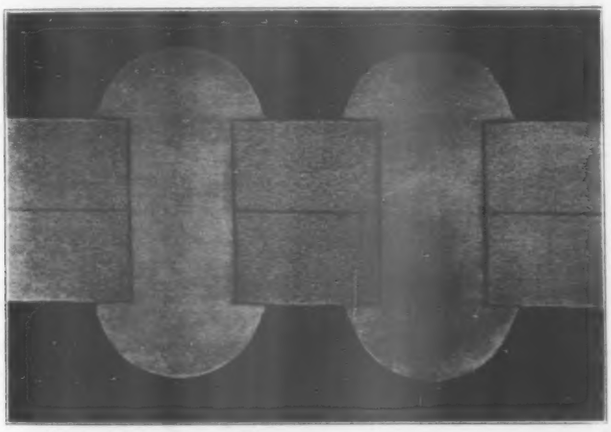


Fig. 1

Fig. 1 shows rivets that were driven hot. You will note that it is physically impossible to make the rivet completely fill the hole. The shrinkage of the rivet precludes this. It is also impossible to heat the rivet and expose it to the air and prevent the oxidizing effect of the free oxygen of the air on the rivet. To overcome these conditions, we investigated the possibility of driving the rivets in our Crane Girders cold, using a cold pressed rivet to avoid a scale formation on the rivets purchased. Having heard that one concern drove rivets cold, up to and including 3 inches in diameter, I called on their works manager, to secure information regarding machines used to drive rivets and the methods used. He very kindly gave me all information requested. However, he stated that it was necessary to anneal rivets up to and including ¾ of an inch, and, above that size it was not necessary to anneal. I was very much interested to learn why it was necessary to anneal a ¾ inch rivet and not a ⅞ inch. The manager advised me that he could not explain why, although by experience he knew it was necessary to anneal up to and including ¾ inch in size. We then inquired of rivet machine manufacturers what style machines they built to perform this class of work, but we were unable to locate a desirable type to perform this operation, as it was necessary to use a portable machine. We then decided to ream our rivet holes only 1/32 inch over-size, instead of the customary ⅛ inch, as we believe that this would provide a better riveting condition and all the holes in Crane Girders for shop driven rivets are reamed 1/32 inch over-size in our fabricating shop and by this method, we find that we are able to increase the efficiency of our riveted connections in Crane Girders. It was necessary, however, that we use a cold pressed rivet, as they seem to be more uniform in size, and it is absolutely necessary that the rivets are not over-size, as a ¾ inch rivet will expand almost 1/32 of an inch in heating.

During the War, I understand that the General Electrical Company were building a heavy duty spot welder at their Schenectady plant to weld plates up to and including 1 inch in thickness. I visited their plant at Schenectady, and, at that time, the machine was in the experimental state. Their difficulty was to provide electrodes to withstand the pressure required to bring the metal in contact which was necessary to perform the welding operation successfully. I have been informed that they built one machine for heavy duty welding and shipped it to Hog Island Ship Yard. However, I have been unable to learn what service it gave.

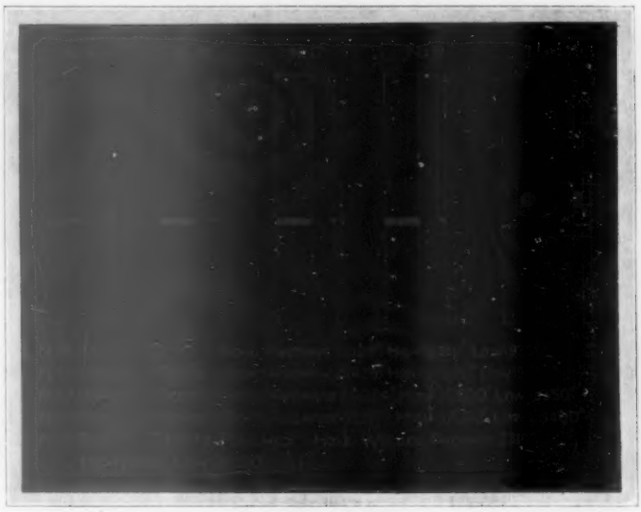


Fig. 2

During the years of 1922, 1923 and 1924, we completely rebuilt over 600 locomotives for ten different railroads. All of these were Class 1, 2 and 3 repairs. Class 3 repair means "necessary repairs to firebox and boiler and complete mechanical overhauling." Classes 1 and 2 repairs requires "new boiler, new back end, or new fire box with complete mechanical overhauling." We found that all railroads that had contracts placed with us for this class of work permitted electric arc welding to be used in repairing the stayed part of the boilers. It was necessary for us to build up the large welding force to take care of our requirements in that line. We, of course, observed the efficiency of the electric arc welded joint in some

From a paper read before the American Institute of Steel Construction.

†*Morgan Engineering Company, Alliance, Ohio.*

of the sheet work in the fire boxes, and noticed a number of cases where the electric arc weld had outlived the new sheets placed in the fireboxes when the locomotive had been overhauled. A great many fear the effects of impact and vibration on an electric weld. Quite a number of the railroads use this method successfully to repair broken locomotive frames. It is hard to conceive a more severe test on an electric weld than this one. This experience caused us to experiment and make tests on the electric welded joint to replace where expedient, the riveted joint in fabricating structural steel buildings.

The exterior of this building is shown in Fig. 3.. The building is 100 ft. wide, 150 ft. long, with two stories and basement. The outside beams on all four sides are wall bearing. There are three rows of columns, with five columns in each row, and with large beams connecting on all four sides of each column on the first and second floors and the roof.

Fig. 4 shows a typical connection on the first and second floors at the columns. There were no rivets used in the entire building. All shop and field connections were electric welded. The connections were punched with sufficient holes to erect the building and the bolts were not removed after erection. However, their value was not considerable in figuring the strength of the joints. A factor of safety of seven and eight was used on all column connections.

Fig. 3

Fig. 4

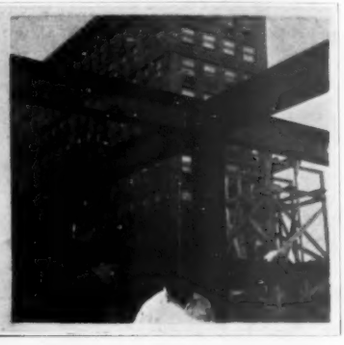


Fig. 5

Realizing the inefficiency of the riveted connections where the rivet is placed in tension, such as plates on the bottom of spandrel beams, we made several test pieces and submitted them to an over-load and determined that the electric arc weld was far stronger than the calculated strength of a rivet in tension. In replacing the rivet used in tension, our next thought was to weld the shelf angles and connection angles. We again conducted a series of tests, to determine the amount of weld required to compensate for the different sized rivets used.

Fig. 2 shows the result of these tests. I would like to call your attention to the fact that in all the tests we conducted, there was no attempt made to favor the weld. You will note from this slide that the welded joints in this series of tests were subjected to a severe bending moment. They were subject to an eccentric pull, and the specimens having been lapped, would of necessity bend where lapped, when the force was applied. We compiled the following table from the result of these tests:

The equivalent strength in shear is as follows:

Rivet Dia.	Length ¼ in. Bead	Length $\frac{5}{16}$ in. Bead	Length ⅜ in. Bead	Length ½ in. Bead
½ in.	1½ in.	1⅜ in.	1¼ in.	1⅛ in.
⅝ in.	2 in.	1⅞ in.	1⅝ in.	1½ in.
¾ in.	2⅝ in.	2½ in.	2¼ in.	1⅞ in.
⅞ in.	3⅜ in.	3¼ in.	2⅞ in.	2⅜ in.
1 in.	4¼ in.	4 in.	3½ in.	3 in.

One-half inch added to theoretical length of weld, and rivet values figured at 10,000 pounds per square inch. Having made a study of this art, and consulted a number of structural engineers, acquainting them with the result of our tests, we decided that we were justified in adopting this method to replace the riveted joint when expedient to do so. At this time, we learned of a building in Detroit that had several connections electric arc welded.

Having secured the contract for the fabricated structural steel to be used in the Peerless Auto Sales Company's Garage, located in Canton, Ohio, we decided that we would attempt to sell all parties interested the idea of electric welding this steel frame, and we secured permission to completely electric weld the entire structure. As we use the electric welding equipment manufactured by the Lincoln Electric Company, Cleveland, Ohio, their electrical engineers offered several valuable suggestions on the welding of this building.

Fig. 5 shows typical column connections on the roof. The columns were extended above the top of the beams and instead of using connecting angles where the roof beams frame into the web of the column, we welded the beams to the top of the column.

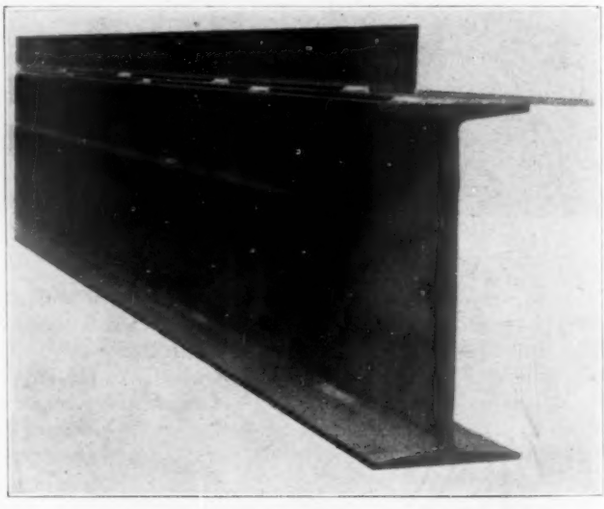


Fig. 9

Fig. 6 shows the type of shelf angles used. I would like to call your attention to the fact that this building was designed for riveted connections, and many of the connections would have been modified, if sufficient time would have been available for re-designing.

Fig. 7 shows method of welding angles on the end of the beam. The one angle was placed on the beam and welded to the web of the beam and the other angle was welded in place. We then had the third bead placed in this connection joining the first two beads. There are a number of ways to effect a saving in material and labor where a floor beam frames to the column. Where connecting angles are used, it is not so important that the beams be the exact length. Were we to substitute a plate for the angles, we could save ma-

terial and the linear inches of weld, or, again we can eliminate both the plate and the angles and cut beams to the exact length, and weld directly to column. With this type of construction, it would necessitate the use of shelf angles welded on the columns with holes in horizontal leg of angles and holes to match in the bottom of the flange of beams.

Fig. 8 shows additional welding on the end connection angles. While the weld on the end was sufficient to carry the load, it was necessary for us to weld at this point, on account of having used angles.

In order to show the weld distinctly, the beam in Fig. 9 was inverted when photographed. This shows the method of welding shelf angles and plates on the bottom of beams which carry the brick wall, also the angle for supporting steel sash. You will note that tack welds were staggered when connecting shelf angles to the beams. Three inches of a weld was used to replace each ¾ inch rivet.

You, no doubt, would be interested in knowing what savings could be affected with this method of fabrication. It would be presumptious for me to attempt to state what savings all builders could affect, as the savings would depend upon shop equipment and individual ingenuity. On the building, in Canton, we were able to save approximately 25 per cent in our estimated shop labor. This savings can, no doubt, be increased eventually when quicker methods of assembling our materials are devised. When these beams were welded, we had three blocks of wood notched out to fit over the flange of the beams and the outstanding leg of the shelf angle. This obviated the work of a fitter for this operation. We then placed the beam on the top of the plate, and you can readily see that the services of a fitter were also unnecessary for this operation. Our shop was equipped primarily to build crane girders and miscellaneous structural parts for a crane, and it is possibly not as efficient on a straight beam and column fabricated job as most shops. If such is the case, we can affect a greater savings on this type of structure. It will no doubt be possible to reduce the size of some sections used in fabricating certain types of steel structures, as there will be no reduction of area in the welded joint. We decided to proceed with caution along this line, as it is possible to become too enthusiastic and have our enthusiasm obfuscate our reason. On the building in Canton, there were 780 field welds, or 358 ft., an average of 5½ inches to the weld. One welder was 120 hours performing the work. We used 110 kilowatt hours for the field welding. When an operator is laying a continuous bead on straight work, he can average from 10 to 12 ft. per hour, with a ⅜ bead. The actual field welding time on this building was possibly 25 per cent of the total time. It is hardly possible, however, to use the linear feet welded per hour to estimate costs, as our costs will depend largely upon the type of joint, form of weld and the size of the bead. At the present time, we are fabricating the crane runway, and figures on the savings are not available at this time.

Fig. 10 shows method used to weld backs of angles to top and bottom edge of web plates. A continuous bead is used for a distance of 4 feet from each end and then intermittent tack welds are used.

Fig. 11 shows weld used on vertical leg of angle and web plate.

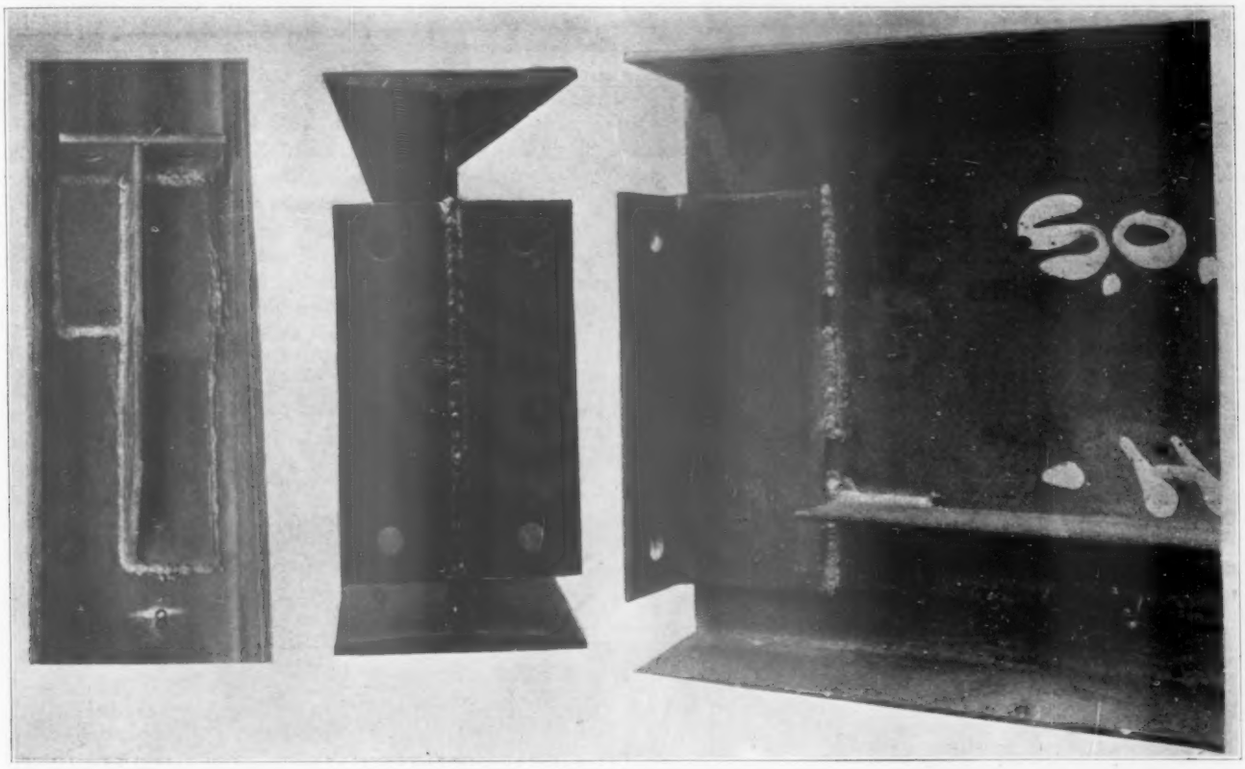


Fig. 6 Fig. 7 Fig. 8

Fig. 12 shows method used to weld channel to top angles. You will note the savings of time in shop detailing, as it is not necessary to consider the interference of rivets. The girder was inverted when photographed, in order to show welds more clearly.

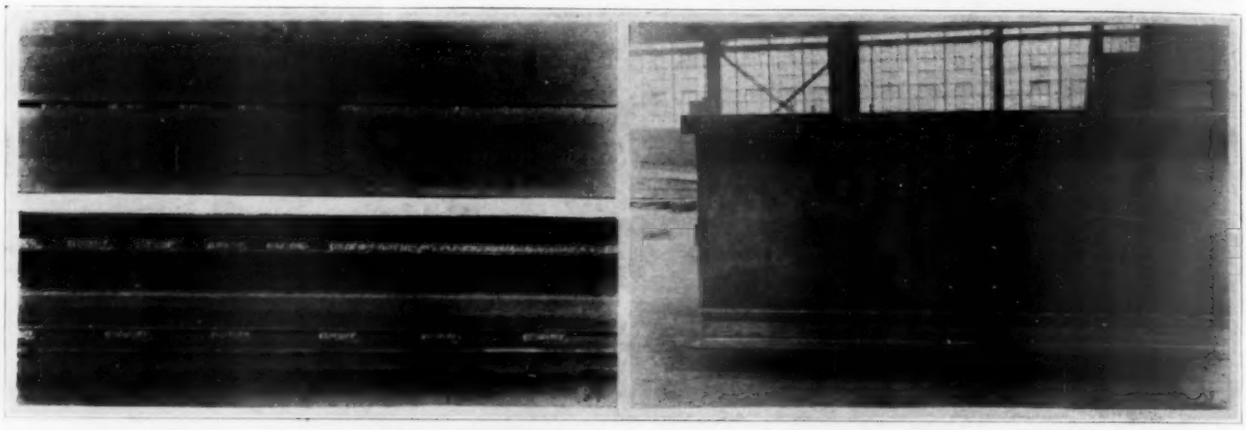
Fig. 13 shows the finished crane girder, with the exception of the stiffener angles. While it is not possible, at this time, to state the actual saving in shop labor in the fabrication of the girders, you can readily see how fabricating girders would be simplified by substituting electric arc welding for riveting.

One of the principal objections to this type of construction seems to be that there is no method of determining the efficiency of a welded joint without destruction. Is this not in a way true of the riveted joint. Does the hammer test conclusively prove that a rivet is not defective? We seriously doubt that it does. However, grant that it does. It is doubtful if

more than 10 per cent of the rivets driven in fabricated structural steel buildings have been inspected. Would it be expedient for us to condemn the use of concrete for this same reason, as much as we might like to? I understand that at one time, several states had laws enacted, prohibiting its use in structures. When most of us think of a weld, there comes to our mind the uncertainties of a forge weld, or possibly we have had some of our automobile parts welded at the alley garage by an inefficient operator. A fusion weld is not nearly so indeterminate as the forge weld. A competent operator can always tell when he has an effectual weld. In considering the efficiency of a welded joint, the individual is a very important factor, and we should endeavor to maintain a very high standard among our operators. We exercise extreme care in the selection of our operators and test to destruction certain welds of each operator weekly. A very simple method of testing welds is to have test pieces made from two bars, bevel one end of each bar to 30 degrees, butt parallel bevel end of bars and weld. Breach these test pieces in the weld with a sledge or by bending in a "V" block in a press. An examination will then disclose the efficiency of the operator. It is well, however, to have standard test pieces made occasionally and pull in a standard tensile testing machine.

In order that the electric welding of steel structures will be guided along safe lines, structural engineers should give careful attention to the design, and use a high factor of safety in the welded joint. Some method should be determined that will protect the purchaser, and a fabricator who has no knowledge of the art and possibly has an inefficient operator should not be permitted to fabricate a steel structure with this method until he can submit certain certified test specimens that test up to the required standards, as one single failure with this method of construction would create an obstacle that would retard our progress considerably.

Quite a few of us expressed the thought that electric arc welding is in the experimental state. This is hardly fair as the art was discovered 35 years ago. However, the same conditions have prevailed with many desirable discoveries. The industrial world has been slow to make practical application of new inventions. Take the steam turbine, and consider the length of time required for Sir Chas. Algernon Parsons to have the commercial world utilize his discovery, and then were it not for Parsons' audacity at the Spithead Naval Review in 1897, when with his trim ship "Turbinia," he deliberately cut across the bow of the royal yacht and when the Commander of the fleet ordered his fastest postal boats to give chase, they were left far behind. Parsons had the fastest ship in the world. Were it not for this display of speed, the steam Turbine might still be in the embryonic state like the art of electric welding steel structures in this country at the present time.



Upper Left—Fig. 10. Lower Left—Fig. 11. Right—Fig. 12

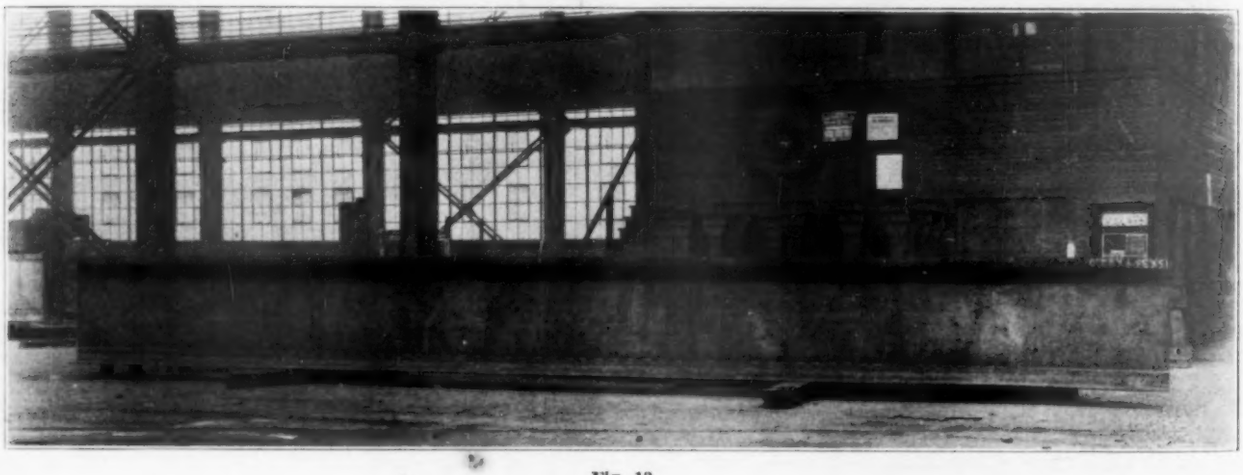


Fig. 13

Mr. Coolidge insisted on having Thanksgiving on November 26th this year, thereby interfering with the regular meeting of the American Welding Society, Los Angeles Section. Although no member would hesitate to forego his turkey dinner and leave his home on a holiday to attend the meeting out of respect for the feelings of Mr. Coolidge, the meeting was held on Thursday before—November 19th—at 6:30 p. m. at the Los Angeles Creamery, 12th and Towne Street.

Study Welding for Two Days

Industrial Plants of Indiana Send Representatives to Purdue University for Conference on All Welding Methods

ONE hundred and fifty representatives from seventy-seven manufacturing industries in Indiana were in attendance at the Conference on Welding sponsored by the Engineering Extension Department of Purdue University at LaFayette on December 3rd and 4th, 1925. This conference was held under the direction of the Department of Practical Mechanics with the School of Chemical Engineering, School of Electrical Engineering and the Manufacturers of Welding Equipment cooperating.

The purpose of this conference was to bring together representatives of the manufacturers of the state interested in the latest developments and possibilities of welding. Electric, Thermit and Oxy-Acetylene Welding in their various forms were included on the program.

Watching a Demonstration of Oxy-Acetylene Cutting in the Lecture Room

Students and Visitors Observing the Metallic Arc Welder at Work

The program offered was as follows:

Thursday, December 3rd

10:00-12:00 Registration—Michael Golden Shops.
Informal Inspection Trips.

Afternoon

Electric Welding—

1:00 P. M. Illustrated Lectures—"Electric Welding." Mr. W. M. B. Brady, District Welding Specialist, General Electric Company, Chicago.
Mr. John B. Austin, Research Engineer, Una Welding and Bonding Company, Cleveland, Ohio.

3:00 P. M. General Discussion.

3:30 P. M. Demonstrations of Typical Welding Operations on Standard Equipment.

Evening

Thermit Welding—

7:30 A. M. Illustrated Lecture—"Thermit Welding." Mr. John B. Tinnon, Rail Welding Department, Metal Thermit Corporation, New York.
Discussion.
Demonstrations of Typical Welding Operations.

Friday, December 4th

Oxy-Acetylene Welding—

8:00 A. M. Illustrated Lectures—"Oxy-Acetylene Welding and Cutting." Mr. E. E. Thum, Publicity Department, Oxweld Acetylene Company, New York.
Mr. G. E. Harckle, Air Reduction Sales Company, New York.

10:15 A. M. Discussion.
Demonstrations of Typical Welding Operations.

Afternoon

Special Applications—

1:00 P. M. Special Demonstrations — **Electric, Thermit** and **Oxy-Acetylene,**
(a) Cutting with Oxy-Acetylene torch.
(b) Welding of special sections.
(c) Rail welding and bonding.
(d) Testing of welded joints.
(e) Other demonstrations to be arranged.

Evening

7:30 P. M. Special Applications (concluded)

(a) Miscellaneous demonstrations.

(b) Rail Welding and Bonding.

Detail descriptions of the three types of welding together with their applications to repair and manufacturing processes were offered by means of lectures, lantern slides, motion picture films and demonstrations.

Special demonstrations were given on Friday afternoon and evening. The most important of these demonstrations were: Welding of lap and butt joints by means of metal and carbon arc and oxy-acetylene flame; rail bonding and welding; thermit rail weld; thermit pipe weld; bronze weld on cast iron; cutting cast iron with acetylene torch; piercing an 18"-billet with the oxygen lance; welding aluminum casting and manganese welding.

The following manufacturers of welding equipment took part in the program and were represented by equipment and exhibits: General Electric Company, Una Bonding and Welding Company, Lincoln Electric Company, Metal Thermit Corporation, Oxweld Acetylene Company, Linde Air Products Company, Pres-O-Lite Company and Air Reduction Sales Company.

Wayne Tank & Pump Company of Fort Wayne; General Electric Company of Fort Wayne, and Heggie Simplex Boiler Company of Peoria, Illinois, were represented by exhibits of products made by electric welding processes.

Those responsible for the program and organization of this conference were W. A. Knapp, Professor in Charge, Engineering Extension Department, Professor J. D. Hoffman, Head of Department of Practical Mechanics; Professor H. C. Peffer, Head of School of Chemical Engineering.

WELDING EXHIBITS AT LONDON SHIPPING EXPOSITION

London is just holding the first International Shipping and Engineering Exposition for three years past. The improvements and new ideas in connection with cutting and welding, which are being exhibited, are of very great interest, and a brief description of the most outstanding should be of value.

The principal concerns engaged in this branch of industry have contributed to the display, and demonstrations are being given on nearly all the stands.

A new model of an oxygen jet metal cutter shown by the Godfrey Engineering Works is a definite improvement on the old design. It is a powerful tool and has been applied to armorplate and to the cutting out of a complete locomotive side frame at one operation. In the new machine the blowpipe is propelled at a regular speed, and it has been found by experience that holes of irregular shape or profiles can be cut to such a degree of accuracy that in most instances no machining is required. A coal gas blowpipe can, if desired, be used in place of one in which acetylene is the heating element, the only difference being that the action of the coal-gas flame is slightly slower. The machine can either be attached to a bench or wall bracket or used as a portable unit. Those who have had experience of this apparatus have stated that substantial economies have been realized as compared with other methods of working. It is an advantage that the blow-pipe and every part of the machine, as well as the work, is in full view of the operator.

A fact which has been taught by experience is the importance in cutting operations, especially of the kind for which the machine is intended, of using only pure oxygen. Even inconsiderable percentages of nitrogen not only reduce the speed of cutting, but, what is equally unsatisfactory, call for an increase in the quantity of oxygen required to produce a given result. It is stated that a reduction in the purity of the oxygen only from 99.7 per cent to 98 per cent is associated with a rise in the time required to make the cut of over 19 per cent, and an increase in oxygen consumption of over 40 per cent. With further decreases in the purity of the oxygen the time and gas consumption rise with great rapidity. This aspect of the subject is deserving of notice by all users of oxyacetylene appliances, and it may well be that the absence of the required degree of purity in the oxygen is the cause of the comparatively high costs occasionally experienced in oxyacetylene cutting operations.

The display of the Quasi-Arc Company affords an opportunity of advantageously studying the most recent electric welding developments. Full-size welded specimens are on view, as well as a welding outfit with which demonstrations are being given. Plant suitable for various alternating and direct current conditions is included. The examples of work carried out on the quasi-arc system include ship construction. The all-welded motorship Caria, formerly known as the Fullogar, is an outstanding example of this class of work—and the test pieces exhibited include those on which the classification societies gave approval to welded ship construction.

In other fields of application also the quasi-arc system is finding extended use. It is stated that 40 railroad bridges on which strengthening operations are in progress to provide for the heavier loads associated with modern traffic conditions are being welded instead of riveted.

Portable generators for oxyacetylene welding and cutting, and lighting plant for locomotives and road vehicles as well as for domestic requirements, are among the exhibits worthy of attention on the stand of Carbic, Ltd. Demonstrations of cutting and welding plant, which are given, show the handiness of these outfits for outdoor and workshop use. The company also exhibit calculating aids for welding engineers.

Conspicuous among the exhibits of Alloy Welding Processes, Ltd., is the Daysohms welder for alternating current. Demonstrations have been given for the application of the methods evolved by the company for shipbuilding, railroad, and general engineering work. The equipments designed for direct current are provided with the special dynamo for which it is claimed that it gives the steady arc required to ensure good work. This type is arranged to be driven by electric motor or gasoline engine and belt. Some new types of reactance coils, resistances, and operators' equipment are included in the exhibits.

A comprehensive array of oxyacetylene and electric welding and cutting equipment is shown by Allen Liversidge Co. On this concern's stand are the complete chain of processes, including dissolved acetylene cylinders and the equipment for welding, metal cutting and lead burning, brazing and soldering, cable jointing and other work. The electric arc welding equipment is designed for both hand and automatic operation, and all the accessories are on view, including flux coated and bare wire electrodes. Demonstrations are being given. The lighting exhibits comprise oxyacetylene and electric arc searchlights of the kind supplied to the British Navy and Air Force.

Plants for spot, seam, tape, and butt welding and combined portable wleding and air-compressor plants, with electrodes and all other accessories, are shown by the Consolidated Pneumatic Tool Co. The combined unit should meet the needs of a large number of users. The concern also shows its usual range of portable labor saving tools.

The exhibit of E. G. Peters & Co. includes the plastic arc system of electric welding. A stationary motor-generator set can be seen in operation, demonstrating the making of a weld in cast iron which can afterwards be machined. The Wilson "Color-Tipt" welding metals are used in this case. Resistance sets for making spot seam or butt welds are also shown.

The need for an outfit suitable for use in small general engineering shops has been recognized by the Hydrogen Oxygen & Plant Co. This plant is a combined welding and cutting blowpipe. Generators for the production of oxygen in small quantities are displayed, and demonstrations are given of oxy-acetylene welding and cutting operations. Materials used for purifying acetylene are included in the exhibit.

Besides supplying liquid air plant for the production of oxygen, nitrogen, argon, and other gases, the British Oxygen Co. manufactures oxygen metal cutters, blowpipes, and high-pressure gas apparatus.

It is impossible to deal more fully in the course of a single article with the many remarkably varied and interesting exhibits displayed at this exposition, but their importance may be judged from the fact that they are attracting engineers and buyers from all corners of the earth. Undoubtedly the welding exhibits have contributed in no small manner to the success of an epoch-making exposition.

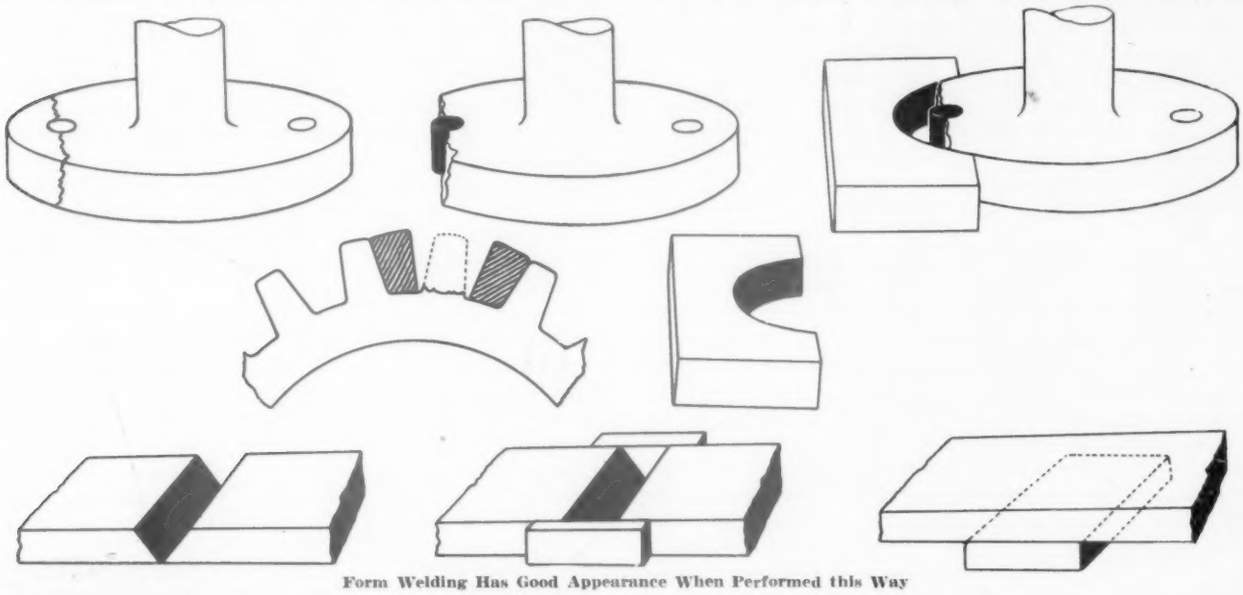
Making Good Welds Look Good

Graphite and Carbon in Different Forms Make It Possible to Improve Both Quality and Appearance of Several Types of Jobs

By R. K. Randall

THE TWO most important things in a weld are strength and appearance. In order to get strength it is important that perfect fusion and penetration take place. The appearance of the weld, of course, is entirely up to the welder just as penetration and fusion are.

How much appearance means in every-day life is known to all. We notice a well-dressed man, a graceful animal, a well-kept lawn, in fact everything that is neat catches and holds us for more than a passing interest. A welding department or shop that turns out neat work that is "dressed up" and neat in appearance will find business increasing. The pyschology of welded work pleasing to the eye will apply to your employers or customers just as other things do that are good to look at, and will win increased respect for your ability as a welder.



Form Welding Has Good Appearance When Performed this Way

The job shop welder usually makes the mistake of assuming that his customer has at his command a fully equipped machine shop or that he likes to file; when as a rule, such is not the case. The welder in the factory feels that any "dressing up" can be done by the machine shop in the plant.

In the case of the job shop welder few of his customers have facilities for finishing work and in the case of the latter, usually the machine shop man could put his time in to better advantage on other work. Adding his time to the welder's we find that in many cases the cost of the labor of both will be more than a replacement cost for the broken part.

Most welding departments and shops usually have on hand a stock of fluxes, rods and other "tools" of the welder, but there is one highly important welding accessory that is missing except in the better class of shops. That accessory is graphite or carbon, in block, rod and paste form. The shops that use them could not get along without them and the shops that do not, fail to realize what a great help they are.

Cast iron, owing to its fluidity, is hard to handle in a molten condition and it is on cast iron that the use of blocks for "damming" or making what is called a "Form" weld is especially helpful. The following suggestions may help the welder who is called upon to execute welds on cast iron whether with the Oxy Acetylene process or Carbon Arc.

Take for instance a broken lug on an exhaust manifold. The break usually occurs through the hole as the section where the hole is is naturally the weakest part.

To build this up "free hand" would mean that the hole would have to be filled in and re-drilled and the edges ground down or filed to make it a job. Drilling and filing or "grinding," all take time and add to the cost of the job and therefore take away some of the profits.

The broken lug can be welded and put back so as there will be nothing to do but smooth up the face a little. Let us assume the hole in the lug is a 5-16 inch. Let's take and put a piece of 5-16 inch carbon or graphite rod in the half hole.

Next take a piece of block and make a form, using the unbroken side for a pattern.

Care should be taken, however, to make the form just a little large than is actually needed to allow for contraction. Next put form on side where repair is to be made.

Now you can make your weld by simply recasting a new lug and when the weld is completed and the form and the rod removed from the hole, the job will be in condition to go back to the customer without the worry of filing or drilling. The molten metal has recast itself inside your carbon mold and around the carbon rod. Any casting where shape must be retained or a hole or series of holes saved can be done in this manner and the small investment in carbon blocks and rods will be more than saved through the elimination of drilling, grinding or filing.

Let us look for a moment at another example. Suppose sketch No. 5 represents a section of any given dimension.

In order to get a good weld it is essential to have the cast iron running like "water" and cast iron in the molten condition would have a tendency to run out of the "vee" like water out of a trough. Suppose we dammed up the sides with our carbon forms. We could make our weld with greater ease and increase the quality of the weld as the molten cast iron would be kept in place through the use of the forms or dams, as they are called.

Gear teeth are built in with more rapidity and greater ease, using the form idea. In this case we make our form only approximate and some machine work or grinding is necessary.

Holes, regardless of the metals in which they are found, are

filled up more efficiently and economically with a backing-up material.

The acetylene welder will find that for backing up aluminum for welding carbon or graphite blocks are a great help as he can then use his paddle right to the bottom of his weld and the finished aluminum weld will be as smooth on the inside as on the out, and he will not have to be afraid of a section dropping.

Sometimes on cast iron work we have a smooth, machined surface which we want to keep. The cast iron when red hot as it is when we pre-heat, oxidizes very readily and means much work to finish again. If refractory paste is applied to the surface to be saved, the air is kept away and thus the finish is saved. Take for instance an automobile block. It is desirable to save the finish on the cylinder walls and the covering over of these walls with carbon paste will protect them form oxidation. For backing up places hard to shape the paste is particularly helpful.

The use of this useful welding accessory is not confined to the acetylene welder but the electric welder can find many uses for it. Let us suppose we are sent into a tank to do some electric welding and we find the section to be welded is wet. It is impossible to strike an arc and get the right start on our weld if the plates are moist. A small piece of carbon or graphite pencil inserted in our holder and run over the work will make short work of the water or dampness and give us in a few moments a warm, dry surface to start our weld on.

Certain special alloy wires for welding on cast iron are helpful in their flow if the cast iron itself is warm. A welding pencil arc will warm up the cast iron sections in a jiffy. This idea is valuable to all who contemplate cylinder repair work using the arc and special alloy wires. Of course in this case judgment must be used as to how the block is made.

Some welders think there is economy in the use of substitutes and sometimes will break up and use fire bricks. The cost of a fire brick will average 6c-8c and when one is once broken it quickly finds its way to the dump. Barely can the same brick be used twice. It does not take many bricks to make a dollar and the same dollar invested in carbon or graphite block that can be used over and over again is a paying investment, besides, the bricks contain elements harmful to the weld.

When we weigh the speed in which the weld can be executed, thus saving gas; the ease of making the weld, due to confining our molten metal with dams; the elimination of grinding and drilling, saving both time and expense of operating the grinder and drill press; and the finished appearance of the weld, which means a satisfied customer; proves that these blocks, rods and paste certainly are a good investment.

HOW WE GET WELDING BUSINESS

An Interview with Roger D. Williams, President, Lexington Engine & Boiler Works, Lexington, Ky.

By Russell Raymond Voorhees

The welder and the machinist cannot advertise in the same way that others can advertise because he will be telling his story to too many people who cannot ever use his services. Such advertising with its large loss costs too much to be profitable regardless of the results that are obtained. Just how to get the business, then, is very often a question that is hard to solve.

Down in Lexington, Ky., there is a firm that has one of the best known electric welding plants in Kentucky. They keep their plant going at a profitable rate the year around. The way they do it, the way they get the business and at a cost that is profitable is interesting.

"We have tried different ways of advertising in order to get welding business but we found, as I suppose most others in our line have found, that the cost was too great when compared with the results," said Roger D. Williams, President of the Lexington Engine & Boiler Works, in discussing his methods of getting welding business. "It is unprofitable to tell your story to everybody when everybody cannot use the services that you are selling.

"For some time I have been using direct by mail advertising and have found that it produces excellent results and at a cost that makes the advertising profitable. We make a strong drive to get welding direct from automobile owners by means of direct by mail advertising. In order to do this we subscribe for a list of names and addresses of automobile owners. This list comes to us in sections, the largest section coming to us the first of the year when the heavy registrations have been made. All during the year, however, supplementary lists are furnished us as new automobiles are registered. These lists give the name, address, motor number, make of car, year and other vital information that gives us a complete picture of the trade that we hope to serve.

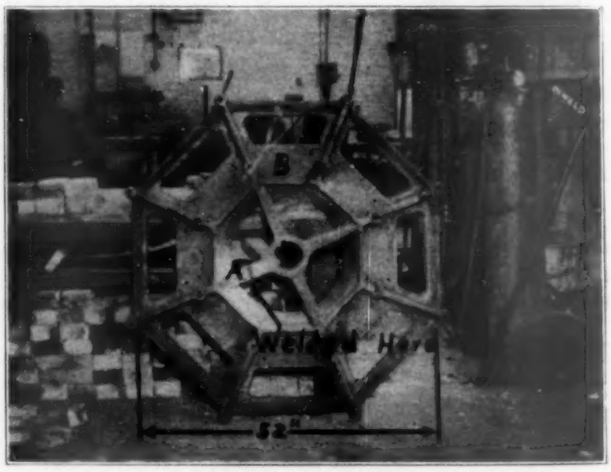
"Every three or four months we circularize this list with a letter that we have prepared. The letters are printed in typewriter type on our own letterheads and are written with the idea of getting the man's attention as soon as he opens the letter. We try to put enough snap and pep into the letter so that he won't throw it way without reading it. In that way we have at least told him our story.

"Every letter that goes out is different but all have that pep in them that seems to bring in the business. We have had very good results with these letters direct to automoblie owners soliciting their welding business.

"We pay about three hundred dollars a year for the list of names but as it contains about 20,000 names I feel that it is money well invested. The letters cost us considerably because we circularize each name three to four times a year. We send the letters under drop postage rates and save something there. Taken all in all it costs money but it brings in the business in sufficient volume so that it is a profitable way to get customers. Many other shops could do the same thing but the cost of the list which is about a dollar a day scares them away. We cover the entire section around Lexington, Eastern and Central Kentucky."

THE BRONZE ROD TO THE RESCUE

Sometime ago, at the Consolidated Water Power, Pulp and Paper Company, Wisconsin Rapids, Wisconsin, the spoke of a casting that weighed 500 pounds cracked. We could not weld it with a cast iron welding rod because B on the inclosed photograph was 9 inches across and 1½ inches thick causing spoke A which was 5½ inches by 2 inches to expand more than the spoke. We then decided to use Tobin Bronze welding rods.



Bronze Welded Casting

The casting was warmed with the pre-heating torch. The crack was made into a V shape, quickly welded with bronze and laid on the welding table. It was then heated and covered with asbestos paper and allowed to stand for 24 hours. The casting was put into the machine and it is now in operation.

This incident shows that bronze welding rods and the oxy-acetylene torch make a combination that will get most any factory out of some tight places.

Competition Among Job Welders

Job Welding Is a New Industry Which Must Depend Upon the Use of Good Fundamental Business Principles for Its Success

By B. Heyman

SINCE the war there has been a typical mushroom growth of job welding shops; so much so, that at the present time competition plays a vital part in the every day existence of each and every one of them. It is one of the most important factors affecting their business relations with each other and with the consumers of welding service. In the survival of the fittest of these shops, as is usual where there is competition, it is to the consumer, to whom has accrued very material benefits, in the form of slashed prices and in the quality of work, upon which has been lavished every bit of skill and experience possible of being commandeered by the welder. For it is only by these means that he is able to build up the good will to hold his customers and retain them for that particular enterprise.

Welding Is Service Work

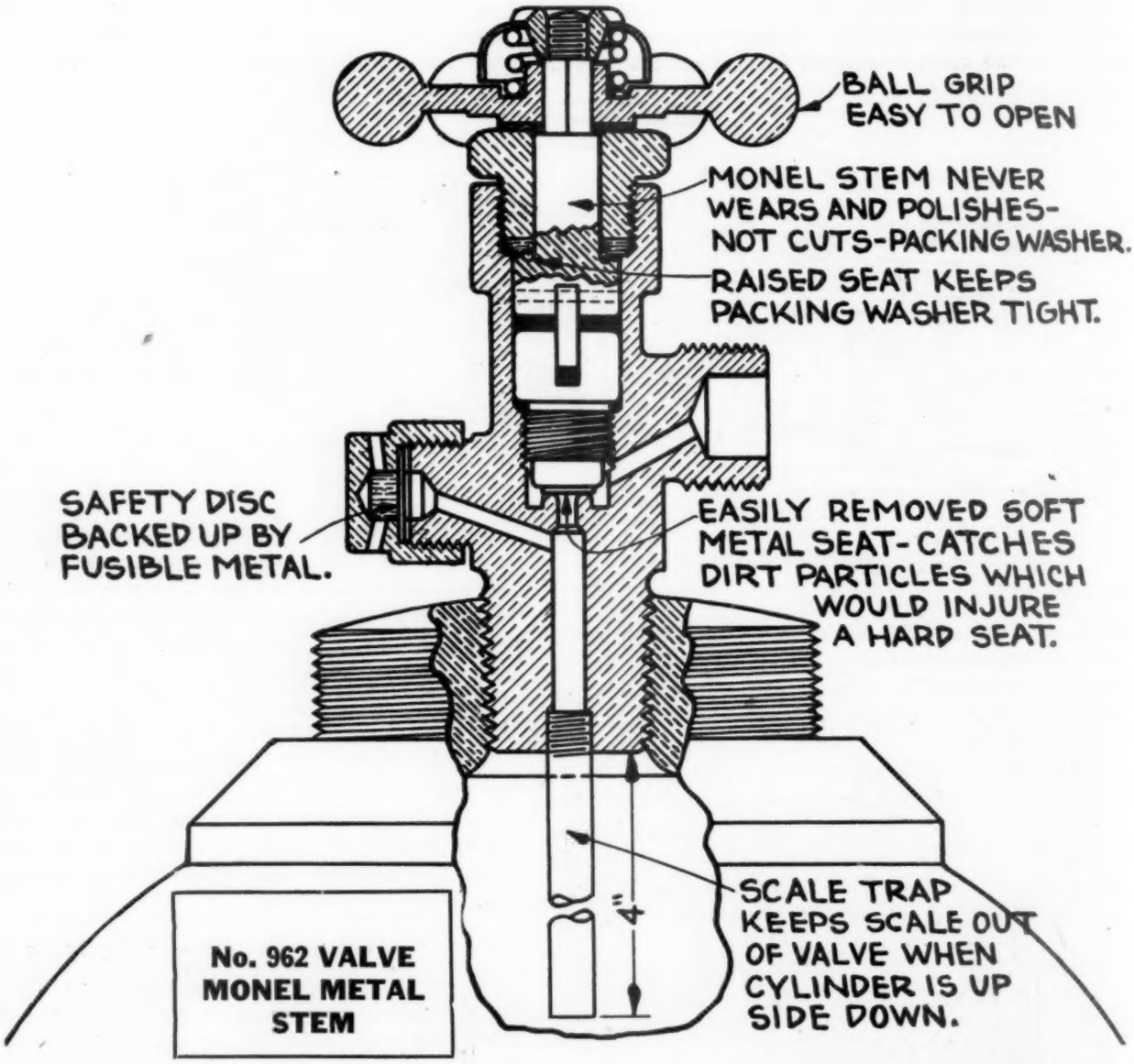
In the last analysis, the job shop has nothing more or less to offer than the services of its proprietor and the personnel. That is as it appears superficially, a mere intangible proposition. Yet, on the other hand, it is as much a marketable commodity — having a fair price value—and is of as much importance as is the service of the medical man in his ministrations to the physical ailments of humanity; or the services of other professional men in their own particular fields of activity. As in the case of any professional service, it is difficult to set any fixed value which can be applied to each and every job, and yet in the majority of instances, the price approaches an average value comparable to the fixed visiting fee of the physician. The remaining possibilities are such, that the price should be proportionate tc the amount of skill and experience necessary in handling them. Usually a specialist is needed and a specialist commands a premium for his services.

In the latter cases, it is the reputation which the welder has built up by long practice which establishes his ability as an expert. Yet he is liable to make a mistake like any other specialist. The only difference occurs in that he cannot bury his mistakes, and their existence, as scrap, until disposed of or salvaged, redounds to his discredit.

Reputation a Factor in Fixing Prices

It appears, therefore, that the reputation of performing skilfully in this work counts for more than anything else in the retention of good will. Proven ability commands the higher price, and not merely that, but also attracts new business. It is the finest kind of advertising medium that the welding shop can possibly use. It surpasses by far the efforts of any trained publicity man or any other form of press agency, although the latter used in conjunction with, and to further the actual work, is the highest and best possible means of broadcasting the welding shop. Unusual methods of distributing information are in vogue and are a gret aid in furthering competitive efforts. The sales service man, operating directly from the welding shop, and acting as the contact man in ob-

OUR BETTER GAS SERVICE



REGO Valves Open and Close Easily BY HAND

CE MEANS MONEY TO YOU

WE give real gas service. No leakage in transit — full measure delivered always. Your gas costs are cut by our having eliminated leaky valves — the chief cause of tremendous waste.

Here's How We Do It

We use REGO Drum Valves because they are absolutely leak proof unless damaged. We make thorough tests of each valve when the empty tanks are returned and before the filled ones are shipped, to make sure that no damage to the valves has occured through careless handling.

Wrenches are not necessary and should never be used, as REGO valves open and close easily *by hand.* The cylinder cap should always be kept on except when the drum is in actual use. This prevents damage through mishandling and keeps the inlet free from dirt.

We have brought our service up to an exceptionally high standard for your benefit. Find out what a great satisfaction real gas service brings by getting in touch with any one of the gas manufacturers listed below.

Acme Oxygen Co	Chicago, Illinois
The Bain-Beaird Co	Shreveport, La.
The Balbach Co	Omaha, Nebr.
Bettendorf Oxygen-Hydr. Co	Bettendorf, Ia.
Burdett Oxygen Co	Detroit, Mich.
Burdett Oxygen Co	Fort Worth, Texas
California Compressed Gas Co	Los Angeles, Cal.
Commercial Gas Co	Minneapolis, Minn.
Dunham Manufacturing Co	Chicago, Ill.
Electrox Company	Peoria, Ill.
Gas Products Co	Columbus, Ohio
Indiana Oxygen Co	Indianapolis, Ind.
Industrial Chemical Co	Phoenix, Ariz.
Interstate Oxygen Co	Wheeling, W. Va.
Kentucky Oxygen-Hydr. Co	Louisville, Ky.
The Logansport Oxygen Co	Logansport, Ind.
Memphis Oxygen Co	Memphis, Tenn.
Michigan Ox-Hydric Co	Muskegon, Mich.
National Oxygen Co	Chicago, Ill.
Ohio Electrolytic Oxygen Co	Cincinnati, Ohio
Ox-Hydrogen Mfg. Co	Kansas City, Mo.
Portland Oxygen & Hydrogen Co	Portland, Oregon
Southern Oxygen Co	So. Washington, Va.
Swift & Company	Chicago, Ill.
United Oxygen Mfg. Co	Philadelphia, Penna.
Utah Compressed Gas Co	Salt Lake City, Utah
Wall Bros. Co	Detroit, Mich.
Wisconsin Oxygen Hydrogen Co	Kenosha, Wis.

taining work can influence business expansion in many ways, provided he is familiar with the technical phases of the work in addition to his selling ability. Oftentimes this knowledge, and the proper dissemination of it, is the means for influencing the prospect to place his work in the hands of the salesman's organization.

Possibilities in Portable Outfits

The use of traveling outfits on regular routes are of great value, but apparently many shops have overlooked its possibilities or are satisfied without it. They feel that they have done all that is required in answering outside emergency calls and do not care to look into the probable financial gain possible in extending the service on a well regulated basis. Just how fruitful such a venture might become in any one locality, it is rather doubtful to make any guess; but it is safe to say that many a job that is now thrown away and lost to the welding shop could be saved were the proper person on the spot with the means and ability to do the trick.

Job shop welding has not confined itself to the welding shop. It is practiced in conjunction with regular production welding in many communities and produces additional revenue for these plants which are capable of handling the work. Also in connection with repair work in garages, blacksmith shops, machine shops, etc., it has opened up a field for revenue. On the other hand it has taken from the job welding shop itself, a great amount of work that would ordinarily have drifted into it.

Skill Is Always Essential

The consumer receives the benefits of this. No matter where the work is performed it calls for a skilled operator. Skillful welding in addition to expert workmanship in other trades gives to the purchaser of repair service the highest possible value for his money. It is hardly fair to argue that the welder can afford to devote much time to other branches of work, although it might be said that if it is satisfactory for the other trades to do so, it should be just as satisfactory for the welding shop. Actually it is far easier to become adept at the many odd jobs around a garage; while it requires a long apprenticeship and much hard application to attain the requisites of the expert in welding lines. Most assuedly there are numerous persons who make a livelihood using the name of welder. Persons with very little experience, having the ability to do a few simple operations class themselves as such, but their knowledge is insufficient for a general line of work. And the many varieties of work that drift into a welding shop cover an infinite range of shapes, forms, and metals. The "war time model" welder usually finds himself unable to cope with the majority of them.

Ethics for Welders

In connection with the element of competition comes the question of ethics. Is there such a factor in existence amongst the welding trade? How does it indicate its presence if it is in existence?

It is undoubtedly true that most of us carry inherently the idea of the golden rule and those engaged in welding are no exception. In most cases the "let live" rule is carefully obeyed. Prices are set to afford full value in the way of service and competitive efforts are carried out in a fair way both legally and morally.

Although in the past there may have been many inas to price, these examples are not now so often encountered. The welder, who, for example, puts in an aluminum patch using a solder preparation, when he has been expressly asked to weld it, cannot expect anything but negative criticism once the practice has been discovered. Or, as in one case, when the job required very careful preheating, the welder eliminated this precaution by soft soldering a copper patch to the casting—because he realized that it was simply an oil retainer and did not serve to take any strains—and then charged for an actual welding operation that had never been performed. Had he explained to the customer what his intentions were, and then charged accordingly, there could have been no just cause for complaint, but under the circumstances, the welder deserves no credit for his deceitful tactics; on the other hand he merits his just deserts.

Fixed Hourly Rate Is Becoming Common

The practice of charging a fixed amount per hour for a welder's time plus the cost of materials, etc., is quite common and works well in all cases where used. It establishes a fair basis of compensation and does not carry with it any financial risk for either of the parties concerned. Still, where such a method is practiced by an unscrupulous person, who uses it in a dishonest way, the consumer loses dollars and cents, which accumulate in the pockets of the operator in the form of an illegitimate profit.

A striking example of this occurred when some emergency oxy-acetylene cutting on a large construction job required a large number of oxygen tanks. Although the construction company's checkers supervised the use of the material, it was a very easy matter for the cutter to switch tanks so that at the conclusion of the work the construction company paid for the contents of many cylinders which had not been used and had probably been delivered on the scene of operations empty.

Such incidents are a rarity, but they do happen. The fact that they are not foreign to the trade does not signify the absence of fair practice. It is true that some men must be tricky. It is also true that there are to be found persons who will take advantage of another person's emergency requirements to pile on a heavy salvage cost, knowing full well that the job must be put through and that it will be, regardless of the abnormal charges demanded. But such acts are rarities and in practically every instance react to the disadvantage of the perpetrator.

Some Interesting Phases of Estimating

One of the important phases of Job welding lies in the methods of estimating. Naturally, the job must first be discovered, but there are numerous cases

where bids must be submitted and it is on the basis of price and method that the result is later announced.

Without going into a detailed discussion as to the determination of price, it is sufficient to say that only by a careful examination of the requirements and application of correct technical knowledge, guided by long, practical experience, can anything but an accurate value be determined. Usually, the price is merely a haphazard guess. Or possibly it may be a maximum estimate fixed with a view to offsetting possible failure to arrive at an accurate figure which will produce a profit. But regardless of any of these it is almost a certainty that some venture must be made as to the value of performing the work.

In some instances, where the purchaser is familiar with the welding processes, he may be partial to one or the other method and will overlook price requirements to some extent in making his choice. In other instances both factors will be weighed very carefully.

Switching Methods Not Good Practice

Considering another question, has the welder acted properly if he accepts the work and then uses some other practice, that is, turns over the work to someone else using another process? For example, the work of cutting out a section from a large diameter shaft, building up certain sections and then welding the pieces together was allotted to an oxy-acetylene welder. The price had been fixed and a form of contract written. But the welder, upon receiving the work at his plant immediately reshipped the shaft to an arc welding organization that was better equipped to handle the job. The work was sub-contracted to this organization and sent from them directly to the purchaser upon its completion. Actually the oxy-acetylene man could have handled the work just as skilfully but his shop was filled with orders and this order was of such an emergency nature that it could not be delayed. Even by sub-contracting there was left a large enough margin of profit to make the entire transaction a satisfactory one for the two welding plants.

From the standpoint of the customer this had not been fair practice, as he had expressly specified an oxy-acetylene welded repair. And he had paid willingly the price which had been quoted. Actually he had not done his shopping properly. Had he been cognizant of the good qualities of the other welding methods and investigated them and requested bids, he would most likely have saved a pretty penny. There was no questions here as to the merits of the two methods except in the minds of the officials of the organization sending the order and they paid accordingly to one shop for acting as the middleman in a business transaction that could have been handled with more advantages to themselves by their own purchasing agent.

Another Case of Sub-contracting

These two shops worked hand in hand in another instance, however, to accomplish work which could only be performed with the electric arc welding process, and which had been allotted to the oxy-acetylene organization because of its extraordinarily fine results on previous orders. In this case the repair consisted in closing a 14-inch fracture in the flange of a thrust bearing located at the very bottom of the engine room of a steel steamer. To have dismantled the engine room to replace the casting meant an outlay of thousands of dollars. Since a torch could not be operated in the cramped quarters where the break was located without even considering the utterly impossible task of preheating the casting it was decided the only apparent solution was to stud and then weld with the arc. And it was by this means that the repair was effected. A trial run after the work was finished proved that the weld was satisfactory, but the ship was soon after laid up with many others of its kind and has not been used since, so that it is impossible to say just how the weld would have endured the vibration and strains of continuous service.

These illustrations are simply cited to show how the practice of sub-contracting may be used between apparent competitors to the advantage of both and yet in both cases the consumer pays an excess charge; in the one due to his lack of information relative to the various methods of salvaging, and in the other because of his preference for an individual concern which had established an enviable reputation, but which had no compunctions about accepting the order notwithstanding their inability to carry out the spirit of the contract.

On the whole though, it is the attitude of the job shop welder to give to his customers what they wish at a fair price and it is the fact that there have been comparatively few exceptions that has attracted to this young industry the volume of business which is every day cluttering up the numerous shops that have grown up with the development of the welding industry.

THE POWER SHOW

The Fourth National Exposition of Power and Mechanical Engineering attained the ideals of its originators for its diversified and well balanced display of valuable exhibits of power and mechanical engineering apparatus. In the number on diversity of exhibits, in attendance and in enthusiasm of both spectators and exhibitors this exposition was far ahead of its predecessors.

Of the 84,599 visiting persons 16,481 registered at the registration desk at the Grand Central Palace during the week of November 30 through December 5 to see this Fourth National Exposition of Power and Mechanical Engineering. The visitors include engineers who were in New York to attend the annual meetings of The American Society of Mechanical Engineers and the American Society of Refrigerating Engineers and others, as well as many prominent executives in industrial and power field. These came from all over the United States and from 23 foreign countries, including England, Scotland, France, Germany, Sweden, Norway, Egypt, Natal, South Africa, India, China, Manchuria, Japan, Australia, Philippines, Argentina, Chili, Peru, Colombia, Porto Rico, British West Indies, Cuba, Mexico and Canada. The plan of sending out invitations for the show, which was put into effect for the first time this year, brought those who were vitally interested in the exhibits.

Three floors of the Grand Central Palace were entirely filled with the exhibits of over four hundred manufacturers representing leaders in the entire mechanical field. There were splendid showings of heating and ventilating apparatus, refrigerating machinery, machine tools and power transmission apparatus, as well as a complete representation of all types of apparatus in the power field. All of the large manufacturers of equipment for steam-electric power plants were represented at the show. This is a gratifying evidence that the Power Show is established as a permanent institution, national in scope.

Viewing the Exposition as a whole, the outstanding characteristic was the large number of working models and full size showings of apparatus. These included stack breechings, economizers, superheaters, stokers, coal pulverizers, air compressors, large motor operated valves, and several showings of combustion control apparatus in operation. Working models included a coal pulverizing plant, several boilers with one side cut away and covered with glass, coal pulverizing and conveying equipment and coal handling devices.

The careful study which the exhibitors had given to the manner of presenting their wares was shown in the exhibits and as a result the show was increased in interest over previous years and formed a valuable educational display.

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Founded by L. B. Mackenzie, 1916

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Mr. Ogden's Paper

SOME comment is made on another page of this issue on the paper which Mr. L. E. Ogden read before the recent meeting of the International Acetylene Association, the subject being "Procedure Control in Welding." When we stop to think that in so many industrial plants all of the welding knowledge is in possession of the welders themselves with the foremen and superintendents at a loss for the method of exercising intelligent supervision over their own welding operations, it is hard to conceive of a contribution to our welding literature which could be of more universal value in this industry than this simple treatise. The author told in a plain and logical way the principles which, if followed, would enable any superintendent to analyze all of his welding operations and have a definite check on all of the factors which contribute to the success or failure of welding in his plant. The value of the thought in providing a procedure control is not only in its completeness but also by the fact that there is no welding operation which cannot be checked against this simple formula. It is true that there are some repair jobs and possibly a few production jobs in connection with which it would be possible to pass over one or two of the checks indicated but that does not make the formula any less valuable. When we pick a welding job at random and apply this formula to it it is surprising to find how much more carefully it is possible to lay plans for a thoroughly satisfactory job by using this as a control for the entire operation. The industry has, for a long time, been striving to enlist the interest of executives and supervisors so that the responsibility for the results might be placed to a better advantage. Mr. Ogden certainly seems to have found a splendid method for paving the way to this result.

Welding and the Engineer

WHY plant engineers should often prove to be stumbling blocks in the progress of welding is not difficult to understand and it is altogether a mistake to take a resentful attitude to the situation when it does exist. Very few men in engineering positions today received instruction on the subject of information of welded joints when they were studying their profession, consequently, welding was not a part of their equipment when they began to practice it and results being a big determining factor in success they have, naturally, played safe by using methods which they knew would give a result rather than one with which they were not familiar.

A few days ago we had the pleasure of observing a number of wide-awake student engineers at Purdue University in attendance at a series of lectures which covered all of the welding process in a great variety of their applications. These young men are destined to hold important engineering positions five years from this time and because members of the industry have taken time to present the facts regarding welding to them there will be far less resistance to overcome when it is a question of asking them to decide upon the adoption of welded joints. Some enthusiasts would make the subject of welding quite a large item in the average engineering course but the more practical ones recognize that there are time limitations, that other subjects are crowding for attention so that there must necessarily be some limit placed upon the amount of information on this subject which can be acquired in a more important engineering course. Everyone who is in a position to assist in the distribution of this information should realize, however, that to make future development easier it is very much worth while to put our time against the students' time whenever the opportunity offers. There are many ways of reaching the engineer of today and that problem is being handled in a number of different ways. If we can get the right information before the engineer of tomorrow our work in coming years will be so much easier.

Safety Work

IT IS with interest we note the recent statement issued by W. H. Cameron, managing director of the National Safety Council, to the effect that since the inception of that organiza-

In logging camps and automobile factories in mines and steel plants you will find the oxy-acetylene torch at work with

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DISSOLVED ACETYLENE

THE PREST-O-LITE COMPANY, INC.
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WORLD'S LARGEST MANUFACTURERS OF ACETYLENE THE GAS OF A THOUSAND USES
BATTERIES FOR AUTOMOBILES FARM LIGHTING RAILWAY SIGNALS AND RADIO

tion the lives of more than 231,000 persons have been conserved as a result of the introduction of educational methods and safety devices designed to prevent accidents. Although pointing with pride to this remarkable achievement, Mr. Cameron laments that last year 85,000 Americans, men, women and children, were killed upon our streets, in our homes and while at work.

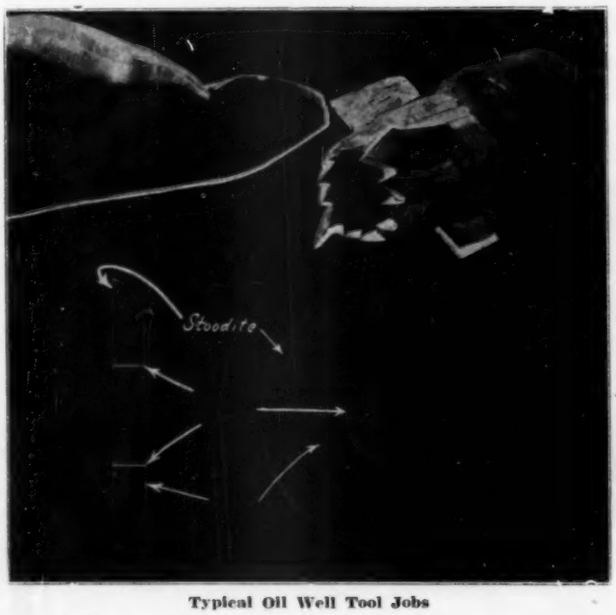
That at least 65,000 of these victims of accidents would be alive today if more people had shown a real interest in the safety movement, is the declaration of the council's executive. He lays stress on the fact that accidents do not just happen but are due to definite causes. Remove these causes and the results are eliminated, points out the safety leader. According to Mr. Cameron, about 90 per cent of all accidents can be avoided through the introduction of educational methods and safety devices. These statements are supported by statistics kept by public utilities, corporations and firms engaged in accident prevention work who have kept careful check of the number of fatalities that occurred both before and after the institution of safety campaigns.

The lack of universal interest in safety work is attributed to the fact that while the industrial costs of accidents total billions of dollars yearly they are spread over thousands of plants so that the price the individual owner of a plant pays is comparatively small when considered with the gross amount of business done during a year.

There are entirely too many employers, however, who forget the humanitarian angle of the safety movement and take into consideration only their own small financial losses. We must remember that our people are our greatest asset and should give greater thought to the conservation of lives and limbs than we do to the maintaining of our buildings, our machinery and our products.

SPECIAL WELDING RODS DEVELOPED FOR USE IN THE MANUFACTURE AND MAINTENANCE OF WELL TOOLS

Prior to the recent discovery of "Stoodite" the Stoody Company of Whittier, California, had with great success placed on the market Stoody's Self Hardening Alloy Steel Welding Rod, supplying a rod that could be used to build up oil well



Typical Oil Well Tool Jobs

tools, giving to them a hard and tough cutting edge and enabling the oil operator to obtain considerably longer service, and more depth of hole per run, besides giving these tools indefinite life.

As previously announced this company has now developed and placed on the market a facing metal known as "stoodite." This rod does not contain expensive alloys, and although it is a product of the electric furnace the rod can be manufactured and sold at a price of $3.00 per lb.

Extensive research and experiments were conducted during this development, in order to obtain a rod that would leave a deposit of the same hardness as the rod before its application. In the manufacture a sufficient and proportionate amount of the various alloys have been added, so that the deposited metal is actually claimed to be superior to the original rod. It is recommended for all rotary oil well tools and any place where an extremely hard non-machinable surface is desired.

These rods can be applied with either the acetylene torch or the electric arc. When using direct current the polarity must be reversed.

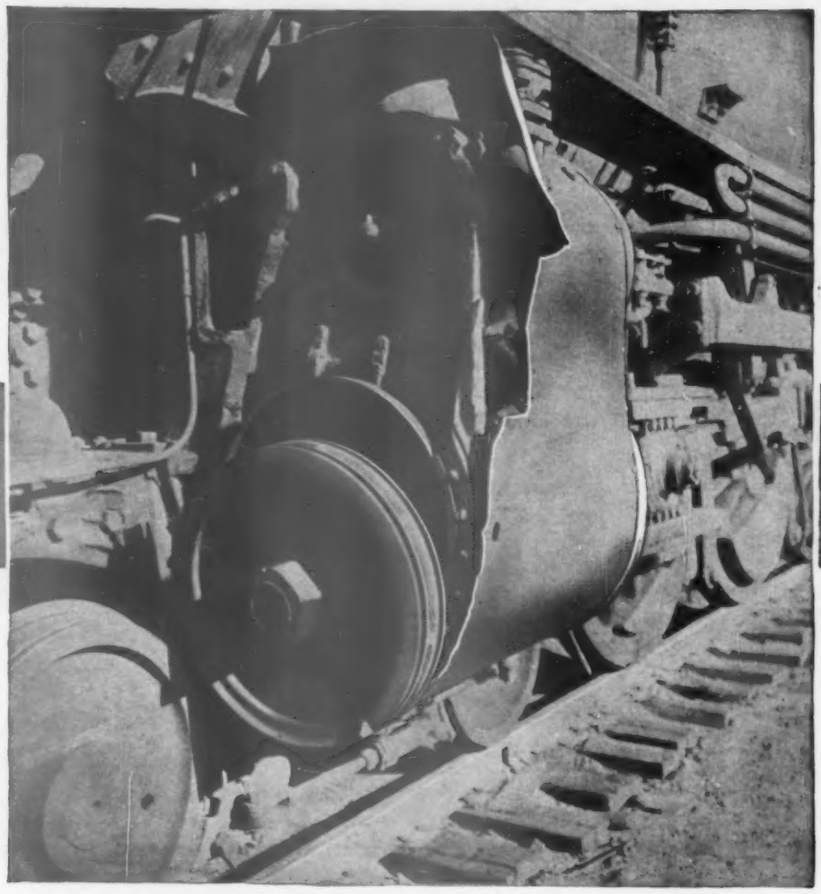
The accompanying illustrations show a few applications. No. 1 shows a fishtail bit faced with Stoodite that had made 45 feet of hole, and had not worn under gauge. In all probability if continued in operation would have more than doubled this performance. Note that the soft metal backing is worn down below the surface of the Stoodite. No. 2 shows a disc bit built up by this method. It is possible to use a disc made of mild steel, eliminating all danger of breaking in the hole. The soft metal backing will wear away quicker than the hard rod, leaving a sharp cutting edge of hard metal at all times. No. 3 shows a built up core bit. This process promotes the extensive use of the core bit as a drilling tool, making it possible to do the entire drilling with this tool.

TORCH INTERESTS MOVIE STAR

Around the motion picture studio the oxy-acetylene torch finds many uses, not only for repairing broken iron and steel articles but also for cutting, as the torch is used in many cases to cut metal shapes which are used for "props." This photograph, supplied through the courtesy of the Educational Film Exchange, shows Miss Helen Foster leading lady of Educational-Lupino Lane Comedies watching an operator at work on a Ford car which is used for an auto-polo game in the new Educational Mermaid Comedy "Lickety Split". Apparently it is a case of doing a bit of dismantling preparatory to a repair job for the operator seems to be using a cutting torch to get rid of a couple of bolt heads in a hurry. Whenever things are habitually done in a hurry, you will find an oxy-actylene outfit on hand for rendering first aid to any injured metal appliances.

Oxy-Acetylene Breaks Into Movies

The consumption of carbide in France during 1925 has reached 60,000 tons compared with 40,000 tons in 1924. These figures apply to carbide used for welding and cutting and indicate that oxy-acetylene welding is making striking progress in that country.



A broken engine cylinder which was later reclaimed by welding.

417 Engine Cylinders Reclaimed Without One Failure

When you consider that a new cylinder would cost $1100, not including cost of installing, and that a fair average for welding is $260, this record becomes even more impressive.

Analysis of the cost of a typical job shows:

Cost of dismantling	$28.00
Cost of valve chamber and cylinder rings	35.00
Cost of chipping, studding and setting rings in place ready for welding	25.00
Labor cost for welding	108.00
Labor cost for machining	8.00
Cost of electric power	22.00
Cost of Electrode material	30.00
TOTAL	$256.00

The repair of broken cylinders is only one of the many jobs which arc welding performs in railroad shops. The G-E Arc Welder is a money-saving tool of vast importance to you.

The G-E Arc Welder gives 24-hour service day after day. It can be readily adapted to light or heavy duty work. It is simple, and easy to operate.

There should be no doubt of the value of a tool that does these things. The welding specialist in the nearest G-E office will gladly answer all your questions.

28-8

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

In Line of Duty

Four Members of General Electric Arc Welding Staff Accidentally Killed While on Way to Visit Company's Plants

FOUR General Electric men were killed and two were injured in the train wreck which occurred on the Pennsylvania Railroad near Plainsboro, N. J., November 12. A brief item concerning this unfortunate accident was printed in *The Welding Engineer* last month, however, owing to the important place these men held in the welding industry it is fitting that some of the details of their lives and of their works be given here. The dead include R. D. Reed, a member of the General Electric industrial department and in charge of the sale of electric arc welding equipment; Mark A. Atuesta and Arthur W. Gross, members of the manufacturing department, and John C. Horstman, of the manager's staff at the Schenectady plant. Among the injured were D. H. Deyoe, of the industrial engineering department of the company, and Thomas Wry, of the Lynn River works.

R. D. Reed

All the men had met in Baltimore in connection with the Inter-works welding committee of the General Electric Company and were en route to the Bloomfield plant when the accident occurred.

Mark A. Atuesta, a member of the manufacturing general department, Schenectady, where he was attached to the staff of H. F. T. Erben, assistant vice president, was born May 10, 1877, at Bogota, Colombia. He entered the employ of the company in 1894 as a member of the testing department, Schenectady works. After several years on test, during which time also he was engaged in ouside construction work for the company, he became foreman in the testing department, a position which brought him into touch with the man now in our district and local offices, who were then on test there. In 1910 he left the testing department to enter the office of the technical superintendent of the Schenectady works, and in 1916 became a member of the industrial heating department. In 1924 he was appointed to the position he held at the time of his death. He leaves a wife and daughter.

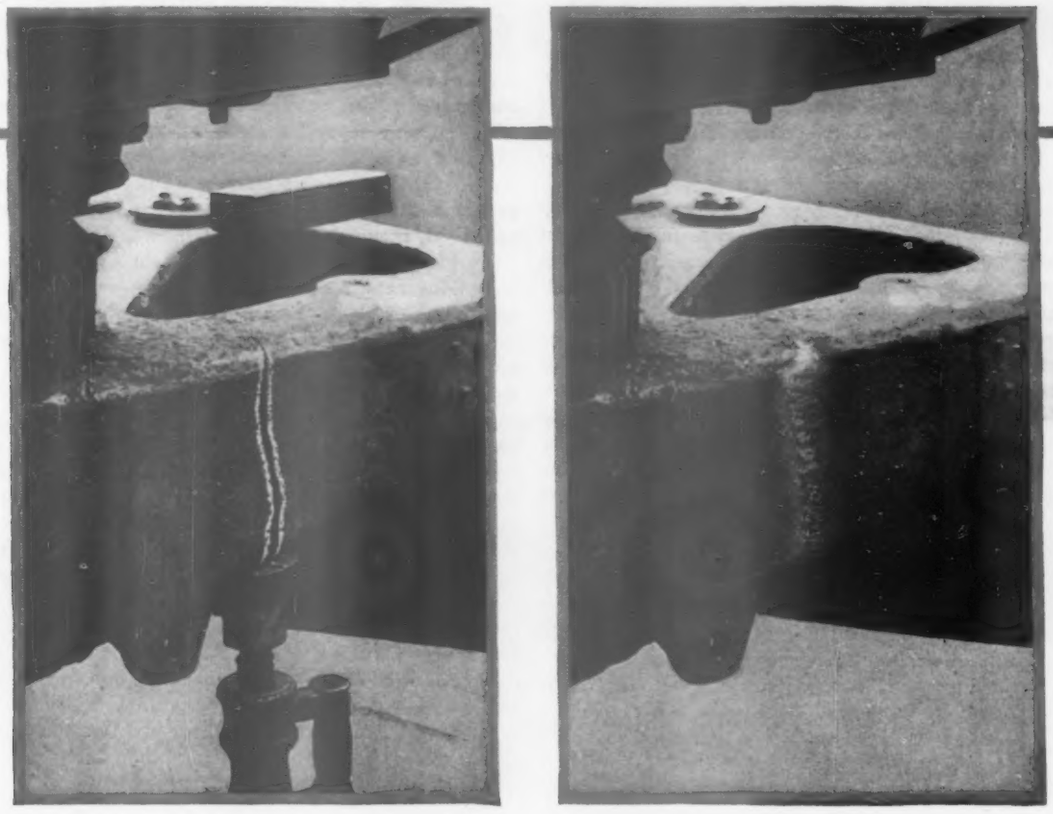
Rollin D. Reed, who had charge of the sale of arc welding equipment, industrial department, Schenectady, was born in New York state in 1882 and was graduated from Union College in 1907. He joined the G. E. organization in 1902, left a year later, and returned in 1907 as a member of the testing department. After completing his work in the testing department, he spent about a year in the induction motor engineering department and two years in the production department. In March, 1919, he was transferred to what was then the supply department, and in January, 1916, became a member of what is now the industrial department. He had had charge of the sale of electrical arc welding equipment since 1919. He is survived by his wife and three daughters, and by his father, a sister and a brother.

Arthur W. Gross, in charge of the factory suggestion system of the various plants of the company, with headquarters at Schenectady, was born at Erie, Pa., in 1893. He attended the Bliss Electrical School, afterward entering the employ of the Burke Electric Company at Erie. He entered the service of our company as a draftsman at Schenectady in 1913, and two years later became a member of the publicity department as a technical writer. In 1923 he was transferred to the office of J. A.

M. A. Atuesta

A. W. Gross

J. C. Hortsman



Back on the job in three hours!

TOBIN Bronze Welding Rods made possible the welding of this cast iron steam shovel frame—in three hours—without dismantling or pre-heating.

If repairs had been made with iron welding rods, the delay and expense of dismantling, pre-heating and re-assembling, would have been unavoidable.

Broken or cracked castings may be restored to their former usefulness—at small cost—by welding with Tobin Bronze, and the resulting weld will be stronger than the original cast iron.

Tobin Bronze Rods, manufactured solely by The American Brass Company, can be secured from leading Distributors.

Descriptive pamphlet, including tables of weights, melting points, also suggestions for welding with Tobin Bronze, sent upon request.

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Canadian Mill: ANACONDA AMERICAN BRASS LIMITED
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TOBIN BRONZE
REG. U.S. PAT. OFF.
WELDING RODS

Smith, general superintendent of the Schenectady works, where he was engaged in plant efficiency work. In 1924 he was assigned to the staff of Assistant Vice President Erben, where he had charge of the factory suggestion system. He is survived by his wife and his father, the latter residing at Erie.

John C. Horstman, a member of the Quarter Century Club, was in charge of the application of electric welding to manufacturing processes in the Schenectady works, and a member of the staff of Manager C. E. Eveleth. He was born at Schenectady in 1876, and entered the employ of our company in August, 1892, at the Schenectady works, where he took up die and tool work. Five years later he engaged in drafting work at the Lynn and the Schenectady plants. In 1902 he entered the D. C. engineering department, and in 1907 joined the testing department, returning the following year to to D. C. engineering. Since 1913 he had been following the line of work in which he was engaged at the time of his death. Besides his wife, he leaves a sister and two brothers, one of them, Walter Horstman, is employed at the Erie works.

Resolutions of Regret

At the 28th meeting of the Northern New York Section of the American Welding Society, certain resolutions in memory of the four Schenectady men who were killed in a railroad wreck November 12, were considered. These resolutions are:

RESOLVED, that the members of the Northern New York Section of the American Welding Society are deeply grieved at the sudden death of Arthur W. Gross in a railroad wreck near Plainsboro, N. J., on the morning of November 12, 1925, and

RESOLVED, that the society feels keenly the loss of a real friend, and a consistent worker for the advancement of the welding art, and

RESOLVED, that the sympathy and condolence of the society be extended to the members of the family in their present bereavement, and

RESOLVED, that a copy of these resolutions be sent to the sorrowing family as an expression of our sympathy for them.

For the Society, W. L. WARNER, Chairman
W. P. MADDEN, Secretary.

THE WELDER'S POINT OF VIEW
By M. J. McElligott

As a reader of your magazine I have followed with interest the work that has been carried on by the equipment manufacturers and the members of the Gas Products Association in the line of training welders for pipe line work, tank work, production work and many other lines of industrial welding.

But so far we have heard very little from the job welder's point of view, and as proprietor of a job welding shop during the past six years I believe that I have met with a few of the problems which have been the cause of much trouble and worry in a great many welding shops all over the country.

I am going to state a few of them, also that I believe would be a remedy or at least a great help in overcoming some of them, and if I have taken the wrong view of the situation I hope that some of the other welders will point the way.

The first problem of the job welding shop is to sell itself to the public, and that takes time, money, and advertising. It takes time to get the people coming to your shop instead of buying new parts, and any one who does not believe that 75% of the people do not know what the welding shop can do for them, has but to visit a junk yard to see for himself. If he cannot pick out of the junk pile of old machine parts 50% that could have been repaired, then he has found something that I have never seen.

Advertising and good work will bring the business, but about this time some fellow gets the idea that all there is to the welding game is a torch, gas, a pair of goggles, a few rods and he is ready to reap the golden harvest. Of course he does not know the first thing about figuring the cost of a welding job, but that does not stop him, he thinks he can do the work a lot cheaper than the other fellow and so he buys a welding outfit from a firm who will give him a few days' instruction in the art of welding, and after this he is ready for anything that comes his way, in the line of welding. If he has the right amount of gray matter under his cap, and knows enough to lay off from the big jobs until he has had time to read and study some good book such as *The Welding Encyclopedia*, and practice on scrap pieces he may get along all right, but he will soon learn that he cannot do the jobs as cheap as he thought at first.

But if this man is not interested in welding as a profession and thinks only of the dollars which he is trying to get his hands on, then what happens?

By his price cutting methods he has made the other welding shops appear as first class highwaymen. Of course he will not be able to turn out a real job of welding, but the jobs that do stand up will satisfy the customer because they do not cost him as much as they would if he had taken them to a welder who know how to figure the cost of doing the jobs, and for the jobs that do come back he has the old alibi (it cant' be done.)

This kind of a welder will tackle anything that comes his way, and here is a case of that kind. Some time ago I was called upon to weld a boiler, and I have always made it a point to have the permission of the state boiler inspector before doing welding of any kind on a high pressure boiler, also have him test it after the welding has been done. In this case the owners did not think it necessary to have the boiler inspector on the job and called in another welder. Of course he would weld it, and the inspector would not have to know anything about it, but in the meantime I have given the inspector a tip. In a short time he was on the job, and after giving the boiler the once over with a hammer it was condemned.

Now the point which I am trying to bring out is this; some states have a law compelling automobile drivers to pass an examination before being permitted to drive on the public highways. Why? Because by so doing they have been able to weed out the drivers who are not capable of handling a motor car or truck and were therefore a menace to the lives and property of others, as well as their own. Then why not compel all welders to pass an examination in the line of welding which they are to do, before turning them out and permitting them to run wild?

If this would not cut out a few of the outlaws, and make the real welders take more pride in his work, then I am a poor judge of the needs of the welding industry.

ANOTHER FIRE THAT ACETYLENE DID NOT START

On Wednesday morning, September 2nd, a fire broke out in the Edison Building, 26-28 North Market Street, Chicago, which the public press intimates was due to acetylene.

We quote from one of the Chicago papers:

"First Deputy Fire Marshal Jerry McAuliffe estimated the damage in excess of $10,000. He said that it might have originated in a small room where a quantity of acetylene was stored."

With a view to getting at the truth the secretary called on the Deputy Fire Marshal who contended that he made no such statements as accredited to him in the article quoted above. He consulted the Chief Marshal's report, which is the official record of the Fire Department, and that shows "Cause unknown."

The room where the fire started, it is said, was a sort of a testing laboratory for electrical apparatus and most likely "something happened there with some of the apparatus which was responsible for the fire."

There happened to be some tanks of oxygen and acetylene upon the roof of the building at some distance away from the room above referred to. It seems workers were removing an old electric sign, cutting it down with the torch. The Deputy Marshal stated emphatically that the gases of our industry were in no way responsible and since he had them promptly removed from the roof they were in no way involved in the fire.—*C. T. Allen in a recent G. P. A. Bulletin.*

Procedure Control Explained

Systematic Analysis of Welding Jobs an Outstanding Topic on Program of International Acetylene Association Convention

ACCORDING to many prominent members of the oxy-acetylene welding industry the program of the twenty-sixth convention which was held at the Congress Hotel, Chicago, November 18 to 20 showed greater promise for future development in the industry than ever before. Officer of the association also point out that the increased attendance shows how heartily the industry is backing association activity, an item which will surely result in favorable developments.

The convention opened with an address of welcome to Chicago by R. B. Harper, of the People's Gas, Light and Coke Company, and response by A. S. Kinsey, of Air Reduction Sales Company. Then the president's address, by W. S. Noyes, of Imperial Brass Manufacturing Company, picturing carbide as a sleeping giant and the discovery of acetylene as the awakening of the giant, gave to the program a keynote of interest which inspired the speakers to make the most of their opportunities. A. Cressey Morrison, in the secretary's report, outlined the past and future activities of the association and explained how useful they could be to individual members. The technical and descriptive papers read before the oxy-acetylene sessions were:

Twenty-Sixth Annual Banquet of International Acetylene Association

Acetylene: Beacon of Progress, by E. E. Thurn, Linde Aid Products Co. Acetylene was immediately recognized as a splendid lighting gas. It has lighted in turn the highways, the seas, the automobile and finally the path of the modern air mail service. Its development as a full gas has opened up a field for great commercial savings through the use of the fusion welding process. Its usefulness has continued in all these applications. It has, in fact, proven to be literally a "beacon of progress" to many industries.

Surveying an Industrial Plant and the Installation of Oxygen and Acetylene Piping by W. A. Slack, Torchweld Equipment Co. Best results from a pipe line system require a survey of the plant prior to the installation. The ideal situation is a centralized welding department. In any event, the number of welding stations must be determined and there they must be located. Then it is important to specify a size of pipe large enough to carry the gas in the necessary volume. An outstanding mistake in many present installations is pipe of too small diameter. Wrought iron pipe, with all joints welded, is recommended, half-inch sizes for drops. Location of generator and manifolds is determined by convenience, subject to the regulation commonly enforced safety bodies. Every detail and dimension of the survey should be noted in the engineer's field book so that complete and accurate drawings of the installation may be made up in the drafting room.

Procedure Control in Welding, by L. E. Ogden, Oxweld Acetylene Co. It has become necessary to furnish to users of welding a definite standard by which they can control the efficiency of their welding operations. This can be done by working out for each job a "Procedure Control." To prepare this control for any type of job it is only necessary to investigate it under the following heads: a. a check on the welders; b. selection and inspection of material; c. design and layout of the welded joint; d. preparation for welding; e. welding technique, including organization; f. inspection of welding and testing of the completed joint. This practically amounts to a formula or recipe for successful welding, applicable to any type of welding job.

Influence of Oxygen-Acetylene Cutting on Steel Foundry Practice, by R. W. Thomas, Vulcan Iron Works. The reduced cost of cutting risers is only one argument in favor of the cutting torch. Engineers are allowed a great deal more freedom in the number and locations of risers, so that the best castings would result, with a resulting decrease in the number of defective castings. In fact, revolutionary economies have been made possible in foundry practice through the use of the torch.

The Part Played by Acetylene in Warship Scrapping, by Commander H. E. Roselle, Construction Corps, U. S. Navy. Numerous tests indicated that acetylene was the cheapest fuel gas to use on this work. The work was further facilitated by the installation of pipe lines for the gas.

Welding of Carbon and Alloy Steel Tubing for Aircraft, by J. V. Johnson, Engineering Division, U. S. Army Air Service. Low weight without loss of strength is obtained through welded construction. The annealing effect of welding has been counteracted by raising the carbon content of the base metal. Low carbon wire seems to give a better bond on the thin tubing.

Jigs are used for assembling, allowing sufficient space to compensate for expansion and avoid warpage. The author questions the value of local annealing on this work for removing stresses. Nearby all failures can be traced to improper welding. The most dangerous defect is a simple adhesion with no indication of the lack of fusion showing on the surface. Failures can be avoided, however, and welded type of plane is easily adapted to quantity production.

Effect of Heat of Bronze Welding on Cast Iron Pipe, by A. R. Lytle, Union Carbide and Carbon Research Laboratories. Neither cast iron nor bronze welding need have any detrimental effect on the pipe. Bronze welding of cast iron is not confined to pipe lines but has many additional applications. Phosphorus in the base metal may have a bad effect. Failures usually occur away from the joint on account of the strength of the bond. Some failures have been attributed to defects in the iron pipe.

How Your Industry Co-operates With the Insurance World, by H. E. Newell, National Board of Fire Underwriters. This paper, together with the report of J. I. Banash, consulting engineer for the association, showed how apparatus manufacturers are working together to make the use of the process, as nearly as may be humanly possible, perfectly safe.

Notes on the Use of Acetylene as an Anaesthetic, by A. B. Luckhardt, University of Chicago. Experiments which have been made here and in Germany indicate that acetylene is a not unpleasant anaesthetizing agent and has no prolonged after effects, though it is not without its limitations. It is no more dangerous than ether. Unfortunately, in many cases where it has been used so much local anaesthic has been used that it has been impossible to evaluate the influence of the acetylene with any degree of accuracy.

Features to be Considered in the Design of Oxy-Acetylene Welding Equipment, by A. J. Fausek. It is to be expected that further improvements in design will be made, which will result in savings to the welder and also more satisfactory results. Safety and low maintenance cost are as essential as the production of a uniformly perfect gas mixture.

Using the Literature of the Oxy-Acetylene Industry, by F. E. Rogers, Air Reduction Sales Co. Trade papers serve to show users how to get best results from their equipment, and how to extend its use, at the same time serving as an effective contact between the welder and the manufacturers of all products used in the industry. Many men in the industry grant the value of these publications, yet do not read them carefully enough to realize their full possiblities.

Several of the papers on this program were illustrated by instructive lantern slides, and practically all of them called forth lively discussion.

Another noteworthy item was the exhibition of welded steel cans, produced in the factory of the National Lead Company, St. Louis. Photographs were passed around showing the automatic welding machine which takes flat sheets, bends them to circular shell shapes, and welds a longitudinal seam of surprising quality. It was pronounced a remarkable piece of automatic gas welding.

The last day of the convention was devoted mainly to acetylene lighting papers, and the convention closed with an enjoyable banquet Friday evening, November 20.

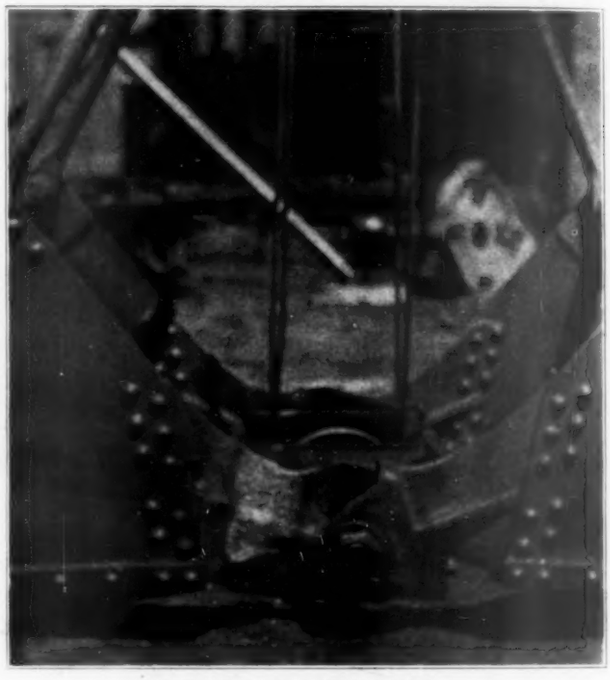
Officers elected for the ensuing year were: President, R. Sossong, Air Reduction Sales Co.; vice-president, W. A. Slack, Torchweld Equipment Co.; secretary-treasurer, A. C. Morrison; directors, J. A. Johnson, Crawfordsville, Ind., and W. D. Flannery, K.-G. Welding and Cutting Co.

HOW SUSPENSION BRIDGES ARE BUILT

John A. Roebling's Sons Company, Trenton, N. J., have recently issued a beautifully printed book on the subject of "Construction of Parallel Wire Cables for Suspension Bridges." This company is well known to the welding trade as manufacturers of Roebling welding wire for gas and electric welding, but in addition to this it has a national reputation for the development of processes of manufacturing all kinds of wire and wire rope. The book which they have just prepared deals with the details of fabricating the heavy cables used in the construction of the Bear Mountain Bridge over the Hudson River northwest of Peekskill, N. Y. Beginning with a description of the wire cable work done on several other important construction projects, the book goes into the principles of assembling wire into heavy cables and then presents a series of photographic studies made during the erection of the Bear Mountain Bridge. Here it gives a beautiful picture of the progress of the work and the various steps in the construction of this cable are so carefully explained and illustrated as to make the engineering features of this construction easily understood.

BACK ON THE JOB IN TWO HOURS

Right in the middle of an important unloading job at a manufacturing plant a clam shell bucket was put out of commission with a broken cast steel ear. This tied up the unloading crane and embarrased the plant considerably, both because it held up the supply of needed material and because demurrage on freight cars was threatened.



Repaired Clam Shell Bucket

It would have taken several days to secure a new part for this bucket and then considerable time would have been required to install it. However, the plant was equipped with oxy-acetylene welding apparatus, so the welder was called upon to repair the piece.

The casting was about ¾-in. thick with a rib through the center. The parts were put in alignment, prepared for welding by cutting out a vee with the oxy-acetylene cutting blow pipe. After carefully cleaning away the slag the break was then welded. The total time required for this work, including preparation and welding, was about 1½ hours. Within two hours from the time the break occurred, the crane was back at work.

NEW OXWELD GENERAL SALES MANAGER

An announcement has been made by the Oxweld Acetylene Company, 30 East 42nd Street, New York City, of the appointment of J. N. Walker as general sales manager. L. D. Burnett has been appointed eastern department sales manager to succeed Mr. Walker, and Z. T. Davis, Jr., is now filling Mr. Burnett's former assignment as assistant sales manager, eastern department. Mr. Walker is well known in the oxy-acetylene industry, having served for many years in progressive advancement through the Oxweld sales organization.

Torch Cuts Track Maintenance Costs

Frogs, Switches, Crossings and Cupped Joints Are Kept in Condition Without Interruption to Traffic

ONE of the most important and interesting developments in the welding industry since the railroad companies first began to experiment with the use of the oxy-acetylene torch for repair work is the perfecting of methods of using the torch for making track repairs. It is an application of the process which has grown rapidly in the past few years and which has made many railroad men good friends of the oxy-acetylene process.

Four Important Operations

Under the general subject of track work for the railroad welder there are four types of operations to be considered: first, the repair of battered joints; second, the reclamation of worn frogs; third, the reclamation of worn switch points; and fourth, making welded joints in the track itself. The average amount of work done on each of these typical jobs varies with individual roads; some of them using the process more for one type of work than another. An article recently published in *The Great Northern Semaphore* estimates that in the course of a year 60,000 battered joints, 3,000 worn frogs and 1,000 switch points are reclaimed by the Great Northern Railroad. An earlier report from the Union Pacific Railroad states that in the year 1923, 895 frogs and 286 switch points were welded. While the volume of each operation varies a good deal, the available figures always indicate that there is a tremendous total volume of such welding to be done.

The application of the torch to the repair of battered rail ends or cupped joints, as they are commonly called, not only increases the life of the rail for several years and adds greatly to the popularity of the railroad with the public by making riding more comfortable, but also saves large sums of money which would otherwise be spent for taking out the worn rails and cutting off the worn section and replacing with new rail. The process itself is somewhat difficult for beginners because it is all high carbon steel wedding. This is true of practically all track work.

A Use for the Carbonizing Plants

There are two fundamental principles which are important to the operator; the first is that the welder must be skilful in laying on his metal and getting away from it so as not to spend so much time working the metal that it becomes overheated. The second principle is the use of the carbonizing flame during the latter stages of the welding procedure to give a hard surface to the rail.

Details of the procedure on cupped joints are given in *The Welding Encyclopedia* about as follows:

The running edge of the rail is heated to a red heat with the welding torch for a distance of 3 in. to 6 in. back from where the rails join and this opportunity is taken to hammer back the rolled edges to the original shape, making the rail even like a new one. Then the top of the rail is brought to a red heat (although this heat is only required to penetrate about an inch in the ball of the rail). Then the surface or skin is broken with the torch flame and all of the old metal of the chipped part either run out or worked in, taking care that no holes are covered up. It is generally considered better to run the old metal out. The new metal is then applied, using a high-carbon steel rod and welding right over the joint, provided the crack is not more than ⅛ of an inch. Experienced operators on this class of work can get across a larger opening than this, but ⅛ of an inch is a good average figure. When enough metal has been added it is smoothed over with a torch, using a slightly carbonizing flame for two or three minutes, just enough excess acetylene being turned on to show in a bright blue green brush. The added metal is then hammered fairly smooth with a machinist's hammer. While the weld is still red hot the smoothing process can be completed with a blacksmith's flattening tool and an eight-pound sledge. The welding torch is again applied to heat the rail across the joint to a red heat. Then it is cut straight across with a hot cut chisel. It is very important that this cut be made exactly over the original joint. After cutting, the parts on both sides of the joint are heated red hot again and the flattening tool used once more, starting on the running side of the rail, coming up and over the top, down on the outside and back again.

In case the rails are too far apart for the above procedure to be followed, each rail end can be welded separately, using the same method as when welding straight across and keeping the surfaces even with a straight edge or carpenter's square. Operators on this work are always cautioned to tamp joints up level before starting.

A New Rail at Half Cost

It is evident that the possibility of making repairs of this sort under traffic or between trains must result in very desirable economies for the railroads. There have been no figures compiled to make actual cost data for the purpose of comparison but a careful comparison would probably show a saving of at least 50 per cent of the cost of laying new rails.

The general procedure followed in making repairs on frogs is also given in *The Welding Encyclopedia* and does not differ in principle from the building up of cupped joints. This work also can be done under traffic and in addition to saving a 2,000-pound piece of metal from the scrap pile on account of the loss of a few pounds at one end, and the saving of labor of taking out the old frog and putting in a new one, with all the additional necessary handling, has been estimated to save about two-thirds the cost of a new frog. The actual welding cost is bound

to vary with each job, but assuming that one-half day is a good average time for one job, which can be handled by a gang consisting of a welder with his helper and one flagman, when the work is done under traffic, the labor cost at $1.65 an hour for the three men would be $6.60, while a generous estimate for the cost of oxy-acetylene filler rods and new bolts at $12.00 would give a total of $18.60 on the job. The small overhead charge to include such things as depreciation of the tools and general supervision of the work would probably not raise this figure to more than $20.00 if costs were accurately estimated.

Some Roads Bring Frogs to the Shop

Of course, it is not always possible to do this work under traffic, but it is not a difficult matter to establish a central point for the repair of the worn frogs and bring them in to such a point whenever they are in need of repair, replacing them at the time they are taken up with frogs that have previously been welded, then putting the frogs in stock and keeping a supply of them available for replacement when they are required.

The economy of this work increases in the case of crossings in which a number of frogs are involved. Here the two important factors are the high initial cost of these special layouts and the expense which would be incidental to tearing them up and replacing. On one job of this kind which involved the reclaiming of two dozen frogs in one crossing, it was estimated that a saving of over $3,000.00 had been made by welding them in place instead of re-laying.

Welded Rail Joints

To eliminate a great portion of the expense and inconvenience of making repairs to joints in the rails where highways and streets cross the railroad tracks, it is becoming customary to weld two or more rails together in order to get a single long length of jointless rail to extend the entire width of such crossings. In making these joints the rails are simply beveled out and butt-welded together. In the case of tunnels it is possible to carry this idea out on a large scale and provide a set of jointless rails extending for the full length of a long tunnel so it would not be necessary to try to do repair work on joints inside the tunnel. This could be done in the field at a location convenient to the point where the track was to be installed and then have the rails dragged through the tunnel and set in place.

Skilful Operators Required

It will be evident that a crew of well-trained men who can be trusted with the responsibility for doing careful work can accomplish considerable savings for railroads on track work alone. It is a class of work, however, where defects in workmanship will be quickly apparent and where careful supervision by men familiar with the welding of high-carbon steel is necessary. Good welders soon master the fine points of this kind of work and after a long practice at it become naturally skilled performers with the oxy-acetylene torch on all kinds of steel welding.

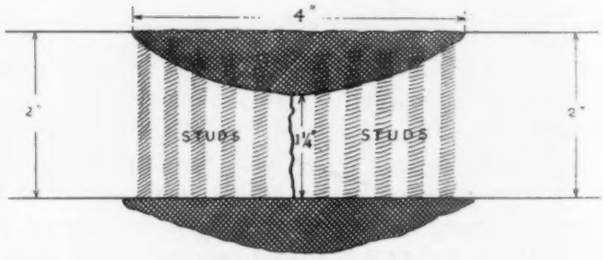
It should be borne in mind also that in track work the oxy-acetylene flame comes in very handy for a number of cutting operations. It is of course the quickest and cheapest way of cutting off a length of rail and is also a great time saver in cutting off old bolts. It is not considered good practice to use the cutting torch for drilling bolt holes in the web of rails. This is practically certain to result in the failure of the rail in service, although this danger can be greatly lessened by machining off the edge of the cut. There are plenty of uses of the cutting torch without using it for jobs which are liable to result in expensive breaks.

CHICAGO SECTION DISCUSSES PROCEDURE CONTROL

"Procedure Control for Oxwelding Cast Iron Heater Sections" was the subject of a paper read by J. W. Haygood, Service Supervisor of the Western Division, The Linde Air Products Company, before the American Welding Society, Chicago Section, at the regular meeting, December 4. The paper was accompanied by lantern slides, which illustrated not only the correct method of preheating and welding the castings, but also the methods of testing the welder's skill and the quality of the finished job. Although weather conditions were unfavorable to a large attendance, there was a fair sized audience for the paper, and its instructive value was appreciated. The subject announced for the January meeting was "Cutting Steel Cars with the Carbon Arc," by A. M. Candy, Westinghouse Electric & Manufacturing Co.

ARC WELDING JOBS ON CAST IRON

W. D. Baugh, proprietor of the Greenkood Welding Works, Greenwood, Mississippi, has been studying the application of the arc welding process to cast iron parts for several years and recently forwarded photographs of a number of interesting examples of his work. Most of these jobs are cast iron varying in thickness and usually of such a nature as to make preheating difficult. Some good success has also been made with malleable iron. Mr. Baugh states that he has been welding cracked water jackets on the car and off the car also crank cases, rear ends



Studded Cast Iron Weld

and frames as well as quite an assortment of pumps and engines ranging from full size locomotive cylinders to odd shaped pumps and engines found in agricultural equipment.

The accompanying sketch shows his procedure on heavy cast iron sections where there is no room to build up on the top surface and plenty of room to build up the bottom surface. The top surface is chipped out and the bottom surface chipped clean. Studs are set in and then padded over according to approved methods. If the bottom side cannot be built up it is prepared in the same way as the top side and in such cases the width of the welding is increased.

With reference to the photographs shown, the cast iron boiler sections were cracked by freezing. They were prepared for welding by grinding the surface down to clean metal, then overlapping beads were carefully applied until the crack was bonded together and water tight. Two other sections of this same boiler were welded at the same time and all of them are still in service.

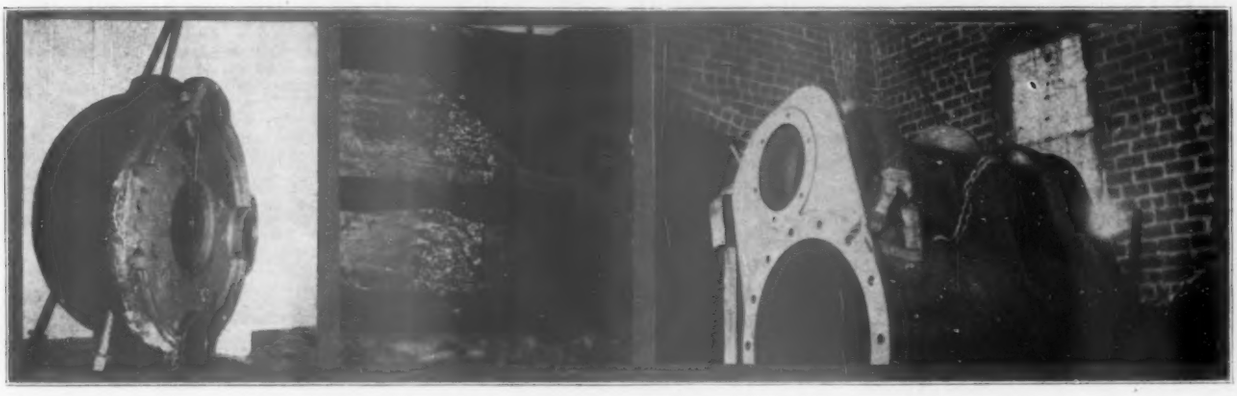
The locomotive cylinder shown was split from end to end. This was jacked into line, studded and welded. Another photograph

shows platen press plate weighing about 1100 pounds. This was chipped out and studded according to the method shown in the sketch mentioned above. This design gives the weld a chance to work at the best advantage.

Another interesting job was an 800 pound bell which was cracked by clapper blows. This was too hard to drill or chip so it was prepared by grinding well below the surface scale. Starting at the top of the crack, a series of beads was laid across the crack, the length of the beads being twice the thickness of the parent metal. A second layer of cross beads about ⅓ narrower than the first was then applied, care being taken to proceed slowly enough to keep the heat from rising to more than 200 degrees F. An ⅛ inch electrode was used. The same procedure was applied to the under side of the break. When the job was finished, those who heard the bell in service pronounced the tone to be perfect.

One of the boiler sections shown was cracked in shipping and was repaired by depositing heavy cross beads without studs, spaced an inch apart then running the spreaded bead between the cross beads to seal the crack. This job was successful and saved a considerable delay during a cold spell. All of this work was done with the "Commercial" arc welding transformer, made by the Electric Arc Cutting & Welding Company of Newark, N. J.

In commenting on this work Mr. Baugh further states that in addition to such repair jobs as those illustrated he has been very successful in such work as tanks, flumes, vats and structural work.



Heavy Cast Iron Jobs

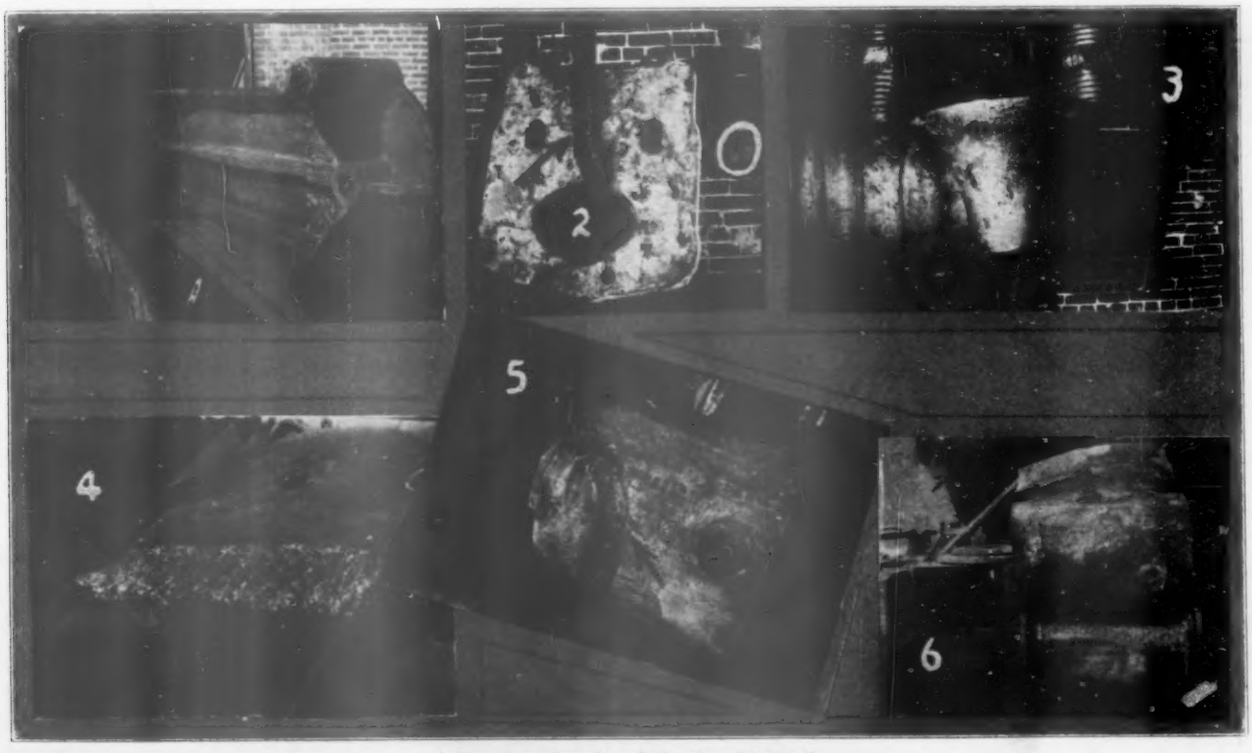
News of the Welding Trade

Loren Campbell, Jr., of U. S. Welding Co., Minneapolis, Minn., was a visitor in Chicago December 7.

The Lincoln Electric Co., Cleveland, in co-operation with the Cleveland School of Technology, will extend the facilities by which students may be trained in arc welding. Students are given training courses in manufacturing plants and receive pay for the time spent there.

The General Electric Co., West Lynn, Mass., is planning the erection of a one-story oxygen and hydrogen plant unit. The plans are private.

At a meeting of the Chicago Section of the American Society of Mechanical Engineers, held December 15, D. B. McCloud, of the Keith Dunham Co., Chicago, read a paper on "The Production of Oxygen by the Liquefaction Process."



A Few More Samples of Mr. Baugh's Work

It is reported that a three-story addition is planned for the plant of the American Brass Co., Waterbury, Conn.

At a recent meeting of the board of directors H. J. Barnes was elected vice-president of the Alumino-Thermic Corporation, Roselle Park, N. J. Mr. Barnes has been connected with the company for the last three years.

The equipment of the welding department of the Cleveland School of Technology has been increased by the installation of one "Economy" electric welder, a new "Milburn" torch and a new "Burdett"torch.

N. A. Strand & Co., Chicago, Ill., announce the appointment of the Machinists Supply Co., Pittsburgh, Pa., as distributors for their line of flexible shafts and equipments covering the western half of the state of Pennsylvania and the northwestern part of the state of West Virginia. They also have appointed Beals, McCarthy & Rogers, Inc., of Buffalo, N. Y., as distributors for the western part of the state of New York. Both of these new agencies will carry a large stock for shipment from those points.

The date of the next annual meeting and banquet of the Compressed Gas Manufacturers' Association has been announced for Monday, January 25, 1926. It will be held at the Hotel Astor.

C. J. Haines, of the Keith Dunham Co., Chicago, Ill., left the United States early this month for a trip to Europe.

The International Oxygen Co., Newark, N. J., announces that it has paid its regular semi-annual dividend of 3 per cent on all the outstanding stock of the company.

J. F. Lincoln, vice-president of Lincoln Electric Co., Cleveland, made an address on the subject of arc welding, on November 9, before a meeting of the Electrical Maintenance Association.

W. Girdler, of Kentucky Oxygen-Hydrogen Co., A. J. Russell, of Bettendorf Oxygen-Hydrogen Co., and O. E. Engler, of the Balbach Co., were in Chicago, Tuesday, December 15, for a meeting of the executive committee of the Gas Products Association. The winter meeting was discussed and the New Palmer House, Chicago, Ill., selected as the place of meeting. The dates are January 20, 21 and 22, 1926.

CURRENT WELDING LITERATURE

THE MANUFACTURE OF OXYGEN, by A. Edgar Knowles.—Historical discussion of the development of commercial methods of producing oxygen with special reference to the electrolytic method. The author points out that there is a continued demand for electrolytic hydrogen which also yields oxygen as a by-product.—The Welding Journal, London, November.

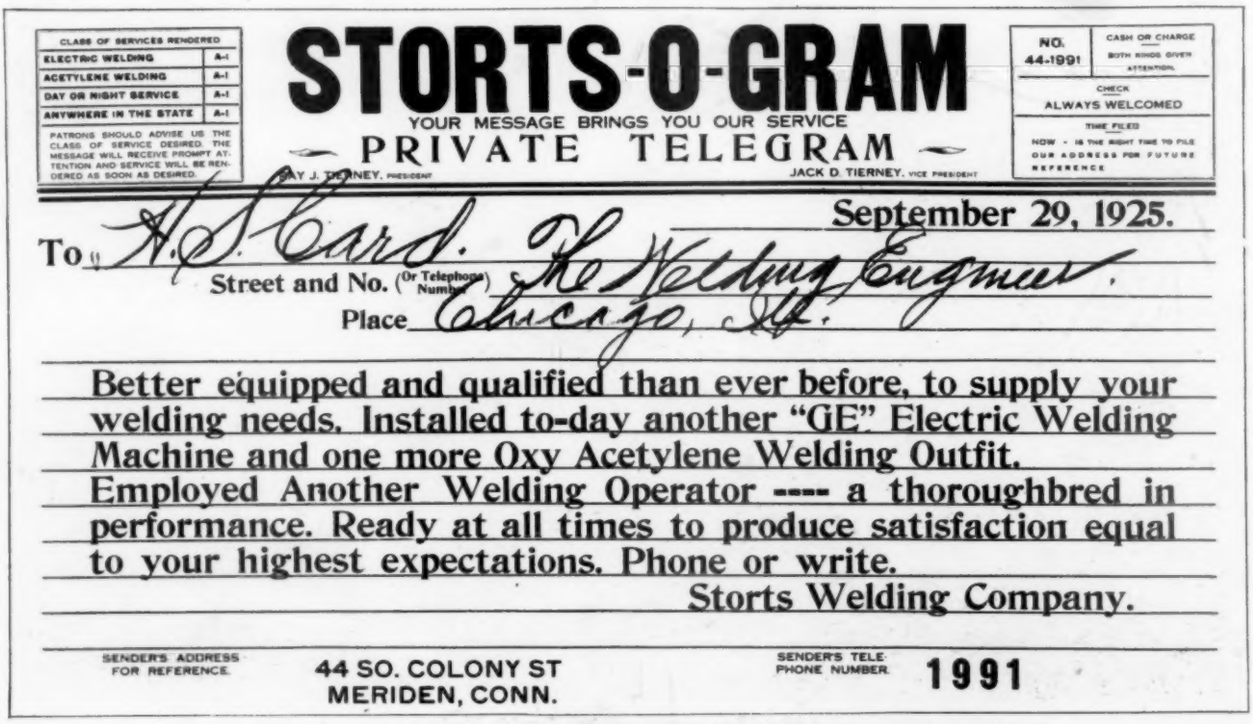
METALLIC ARC WELDABILITY OF FERROUS METALS, by C. J. Holslag.—The chief problem encountered is the protection of the arc from contact with the atmosphere. This is done by holding a close arc and by the use of flux coatings. There is no pure iron or mild steel that cannot be arc welded but easiest ferrous metal is mild steel of .06 to .16 carbon range. Chromium nickel alloy steel electrodes prevents the formation of hairline surface cracks. Flux coatings are useful with all alloys.—The Welding Journal, London, November.

SURVEYING AN INDUSTRIAL PLANT AND THE INSTALLATION OF OXYGEN AND ACETYLENE PIPING, by W. A. Slack.—When preparing for a new installation the ideal arrangement is to have the welding department centralized. Whether this is possible or not, the location of the welding stations should be selected with great care and provision must be made for a large enough pipe to meet the requirements. Rules and regulations which govern the installation and operation of generators and manifolds must be carefully observed. Much time will be saved if the engineer makes complete notes while making his survey, so that the draft room can make accurate specifications for the entire layout.—Acetylene Journal, December.

WELDING OF CARBON AND ALLOY STEEL TUBING FOR AIRCRAFT, by J. B. Johnson.—An airplane is a good example of a construction which must possess maximum strength and welding has proven to give splendid satisfaction for this purpose. It is possible to get perfectly satisfactory welds for airplane construction and the process has the further advantage of lending itself well to production work.—Acetylene Journal, December.

WELDING RODS AND FLUXES.—Importance of proper selection of welding rods, steel welding rods, cast iron rods, nonferrous rods. Composition and use of fluxes. Tables of information regarding welding rods.—Acetylene Journal, December.

SUPPLIES FOR LINCOLN STABLE-ARC WELDER.—Supply catalog recently issued by the Lincoln Electric Company, Cleveland, Ohio. This is an eight-page booklet listing welding cables, welding shields and helmets, welding aprons and gloves, brushes, electrode holders and arc welding electrodes. Information regarding these products is supplemented by a series of letters received from users.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How a Connecticut Welder Advertises His Shop. The Original Was About Eight Times This Size

OXY-ACETYLENE TIPS.—Monthly publication of the Linde Air Products Company. The December issue contains the following: Oxwelding an Ore Concentrator, Magic Wand and the Scrap Pile, The Customer Must Benefit, Big Pipe Made from Flat Plate, Small Unit Savings Reach Important Total, The Blowpipe an Indispensable Tool, Cast Iron Cutting in Machinery, Demolition, Bronze Welding Makes Pump Repair Possible, Oxwelded Cooler is Leakproof.

TESTING THE FINISHED WELD, by S. W. Miller.—The testing of any structure, including those made by welding, should be done in a way which will show its resistance to the stresses which we know exist in service. Tests for resistance to corrosion usually need to be made by actual service. The most valuable welding test is the tensile strength test. If possible the weld should be designed so as to make it of greater strength than the base metal. —Journal of the A. W. S., November.

GASES IN METALS.—The Determination of Oxygen and Hydrogen in Metals by Fusion in Vacuum, by Louis Jordan and James R. Eckman, Scientific Papers of the Bureau of Standards, No. 514, obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10c per copy. This booklet is a discussion of experimental studies which were made of methods of fusion employed in previous vacuum fusion methods and of a new vacuum fusion procedure which has developed for the determination of oxygen and hydrogen in metals. The method is applicable to the accurate determination of oxygen in pure iron, steel, cast iron and pig iron and also in many non-ferrous metals and alloys. The presence of sulphur in the iron or steel sample does not interfere.

WELDING ORNAMENTAL IRON WORK, by R. Weimer.—Use can be found for all forms of welding in ornamental iron work, although the standard specifications issued by the American Institute of Architects makes no mention of welding. A great advantage in constructing stairs is the absolutely tight joint secured. Welding shows considerable savings in this work, but some of the jobs have peculiar difficulties. There is little data available so the subject is a good one for research.—Engineering and Contracting, November 25th.

SMITH-O-GRAMS.—Monthly publication of Smith's Inventions, Inc., The November issue contains a long article on the use of oil burning pre-heating torches showing how these torches can be used not only for pre-heating but for a number of miscellaneous jobs around blacksmith shops, garages, railroads and industrial plants.

ARE WELDED PRESSURE TANKS SAFE? by John S. Spicer.—A number of failures which have been due chiefly to poor design or workmanship have led to the adoption of various restrictions on the use of welding for tanks. Regulations which are now being considered will be passed upon authoritative information from both manufacturers and users.—Boilermaker, November.

PRACTICAL METHODS FOR MAKING WELDING TRUCKS.—Reproduced from a recent issue of Oxy-Acetylene Tips. This article gives in detail the procedure control which has been worked out for the manufacture of all welded trucks.—Boilermaker, November.

OXY-ACETYLENE TIPS.—Monthly publication of the Linde Air Products Company. The November issue contains the following: Welding Fifth Avenue to Forty-Second Street, Fabricating Flue Brackets, They Never Break Again in the Same Place, Welding in the Production of Concrete Pipe, Welding Stern Frame Is Cheaper, Procedure Control for the Reclamation of Copper Tuyeres and Coolers, Cement Mills Need Oxwelding, Cleaning Tire Molds, Not Cut Too Big.

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THE CONSTRUCTION OF PRESSURE VESSELS BY WELDING IN AMERICA.—A discussion of the code of rules adopted by the American Society of Mechanical Engineers with particular reference to the limitations imposed on the use of welding. The code is regarded as severe and as putting too much restraint on the process. The comment is also made that there is a more favorable opportunity for welding in France, because of the prudence which is always exercised by the users and because the authorities have taken greater pains to understand the real merit and possibilities of the different processes.—Revue de la Soudure Autogene, October.

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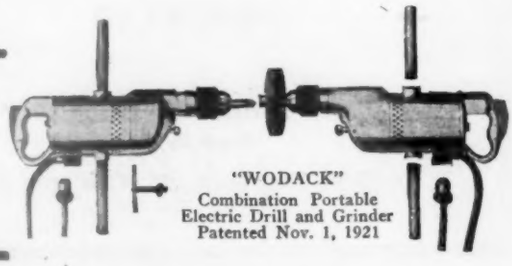

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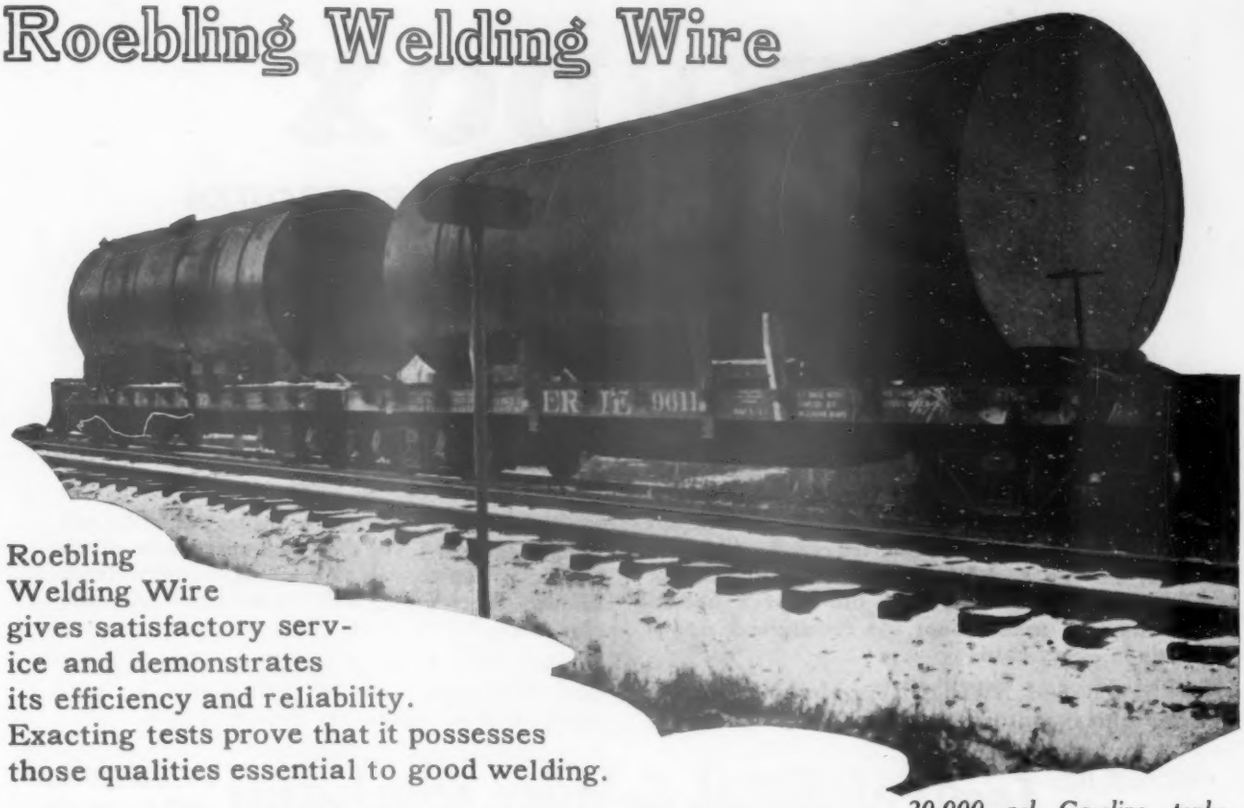

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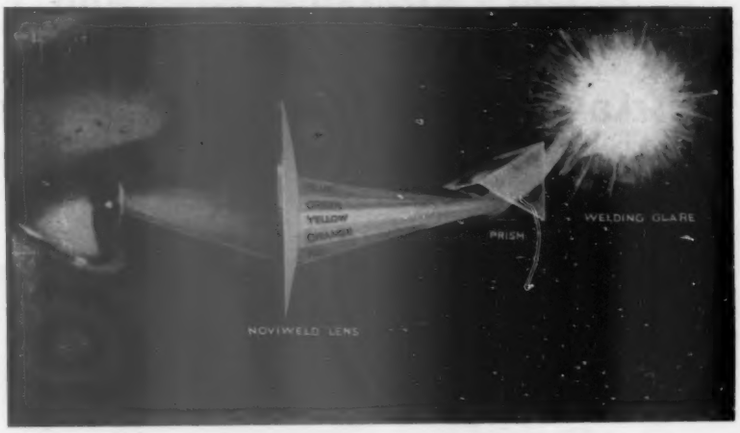

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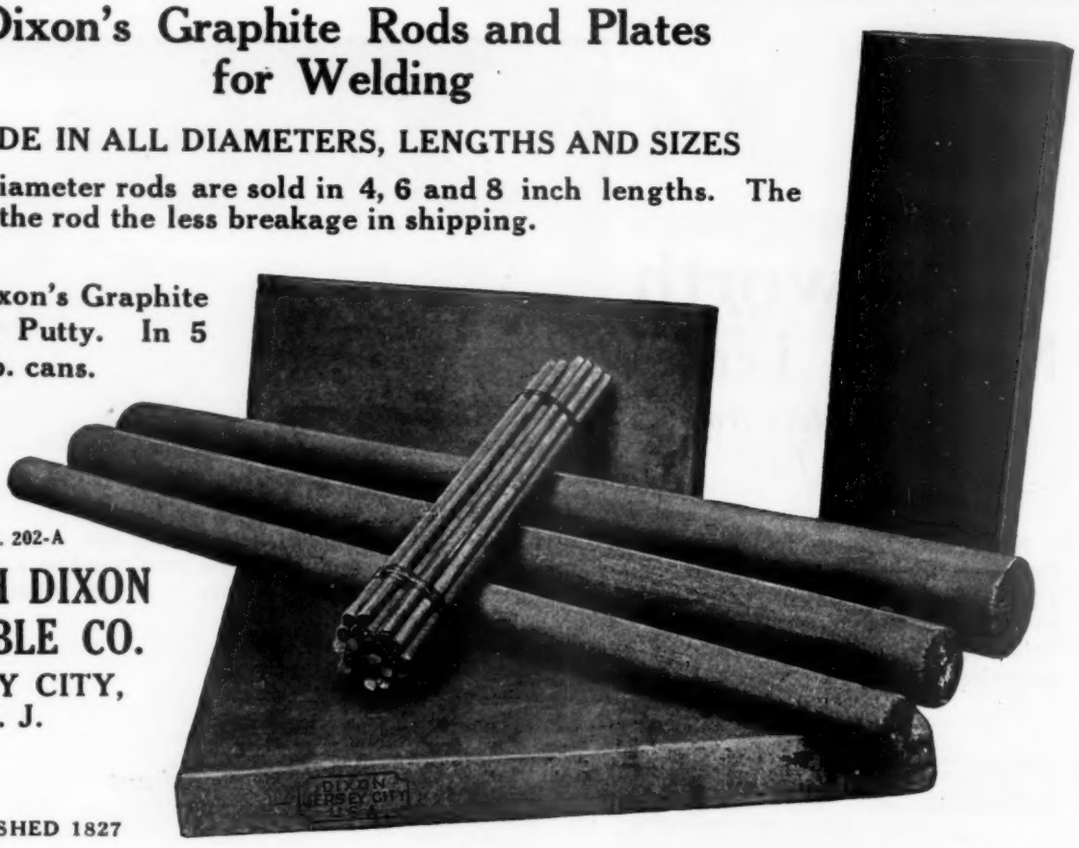

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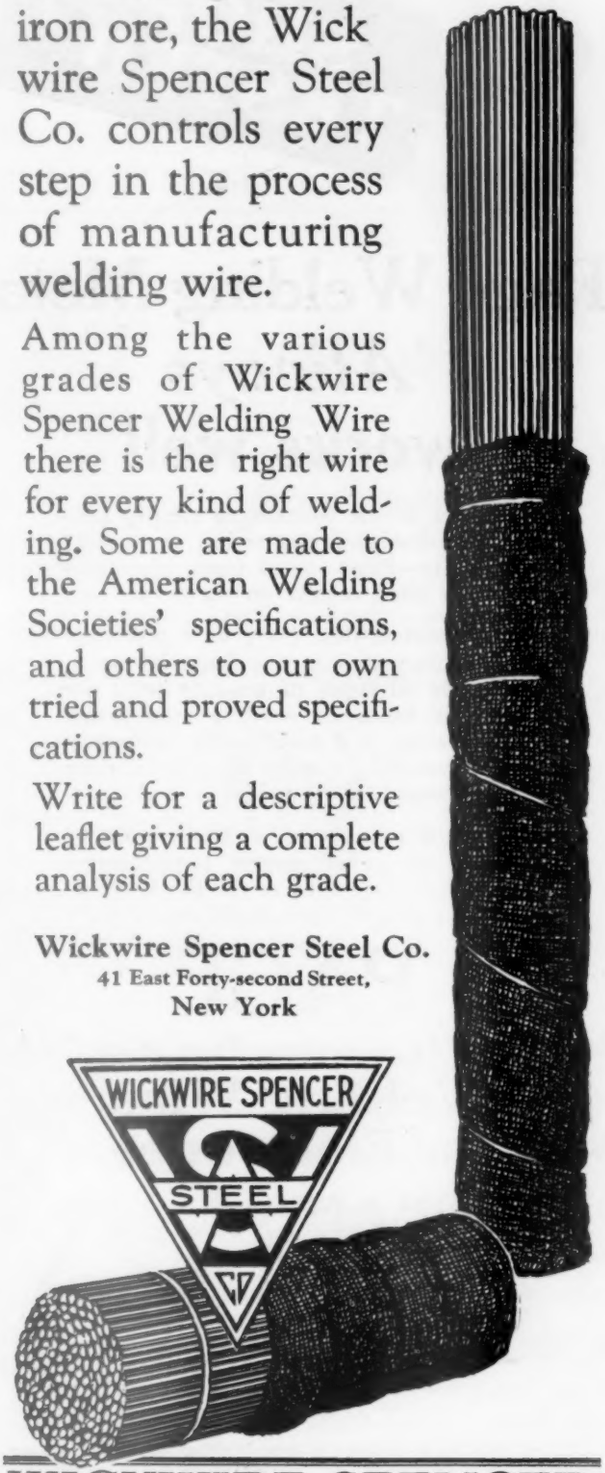

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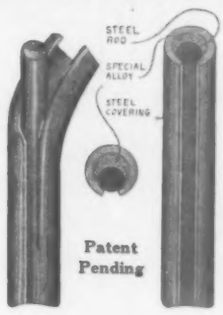

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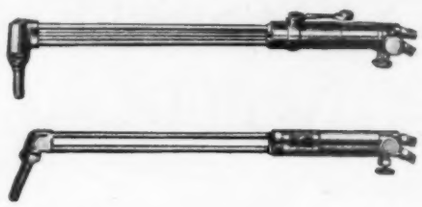

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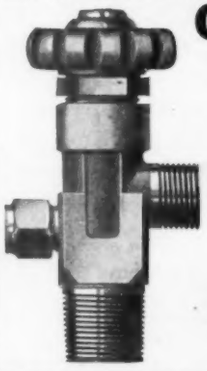

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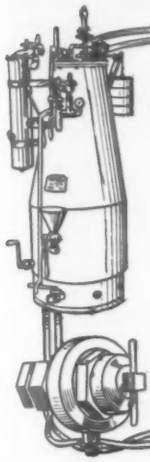

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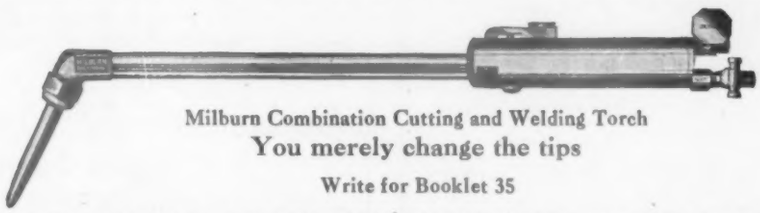

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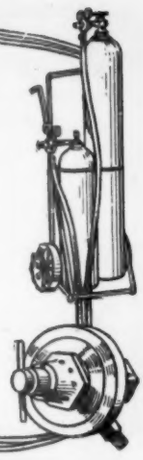

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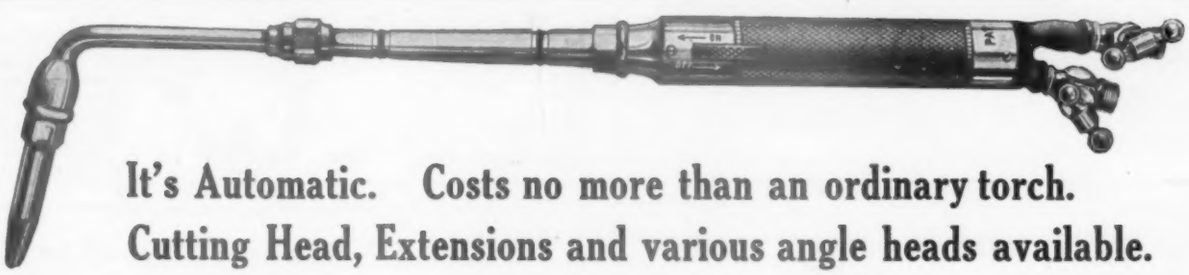

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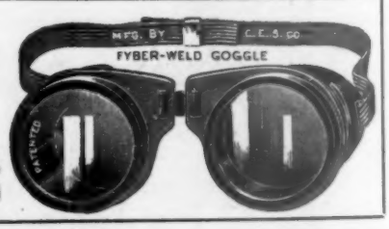

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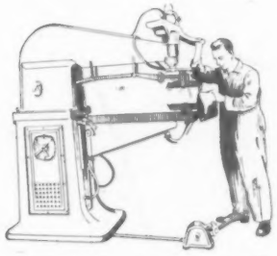

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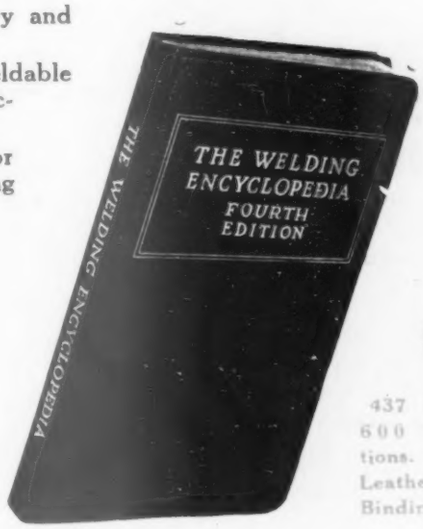

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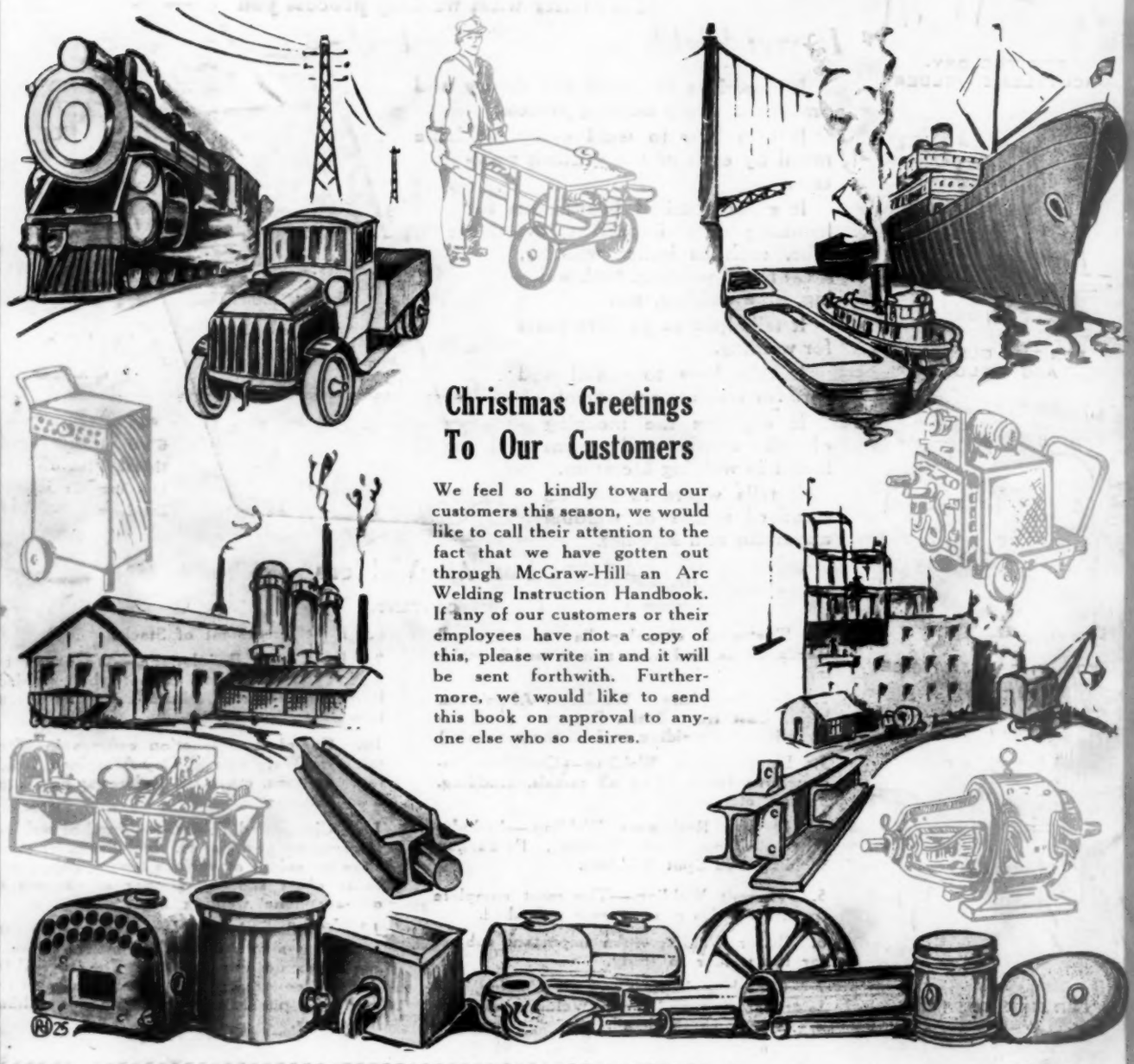

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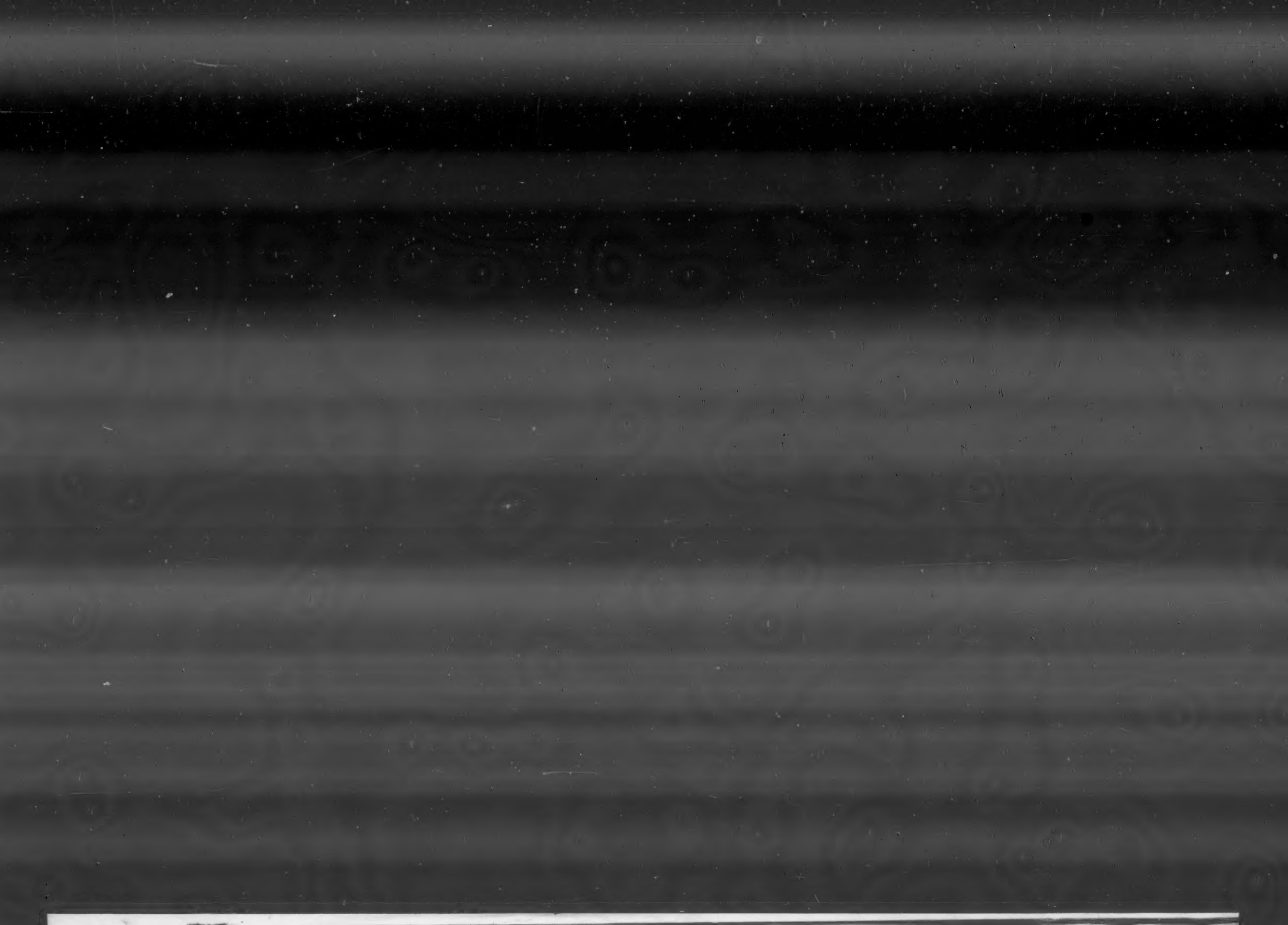
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